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A Revision of the Genus *Poltys* in Australasia (Araneae: Araneidae)

HELEN M. SMITH

The Australian Museum,
6 College St, Sydney NSW 2010, Australia (address for correspondence)

and Faculty of Agriculture, Food and Natural Resources,
University of Sydney NSW 2006, Australia
hsmith@austmus.gov.au

ABSTRACT. The genus *Poltys* C.L. Koch is revised in Australia and partly examined in the wider Australasian region. *Poltys coronatus* Keyserling, *P. keyserlingi* Keyserling, *P. multituberculatus* Rainbow and *P. penicillatus* Rainbow are synonymized with *P. illepidus* C.L. Koch; *P. microtuberculatus* Rainbow is synonymized with *P. stygius* Thorell; *P. bimaculatus* Keyserling, *P. mammeatus* Keyserling and *P. salebrosus* Rainbow are synonymized with *P. laciniosus* Keyserling; *P. sigillatus* Chrysanthus is synonymized with *P. frenchi* Hogg. Five new species are described, four from Australia, *P. grayi, P. jujorum, P. milledgei* and *P. noblei*, and *P. timmeh* from New Caledonia. Notes on the biology of Australian species are given and a key is provided. DNA COI and ITS2 sequence data are used to test the species separations. A checklist of all *Poltys* types from the region, including illustrations, is provided.

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Poltys C.L. Koch is a rather distinctive araneid genus that can be recognized by a combination of widely separated lateral eyes and a pear-shaped carapace, where the "stalk" of the pear is an eye tubercle. The Australian species for which some biological information is known are nocturnally active, building finely meshed orb webs at night and reingesting them around dawn. Adult males are small and do not make webs; females are medium to large spiders. Moths are the most frequent prey. The spiders are cryptically camouflaged and during the day they hide motionless on vegetation with the legs drawn tightly around the prosoma and just the median eyes, which are situated on the anterior of the eye tubercle, protruding between the legs. In this position they often resemble part of a dead twig, a gall or a broken piece of wood. Most Australian species are rather variable in abdominal shape and colouration. This has led to confusion in the identification of species and inconsistencies in taxonomic descriptions.

Historical information

The original specimen described as *Poltys illepidus* C.L. Koch, came from "Bintang, Singapore" and was sent to Koch from the collection of Professor Reich of Berlin. The combination of carapace characters seemed so strange that Koch felt justified in making this a new genus, despite the fact that the specimen was incomplete, without an abdomen. Although this description was somewhat inadequate, at least at the specific level, the epithet soon became associated with a widely distributed and variable species with a rather tubercled, shield-shaped abdomen. The name "illepidus" means rude, rough or disagreeable and was probably thought to be appropriate to these rather lumpy and irregularly shaped specimens.

Some other species, which were subsequently described, had tall and sometimes bizarrely shaped abdomens. Others

were similar to these, or the assumed *P. illepidus*, but showing variations in shape and colour. All of these types were female, or subadult female. Of the early authors only Simon (1895) described a (juvenile) male from Ceylon (Sri Lanka), although he was unsure as to which species this belonged. [The description was attached to *P. idae* (Ausserer) by Roewer (1942) and this was followed by Platnick (2005), but apparently this association was not intended by Simon]. More recently, males of some species have been figured in a number of works (e.g., Davies, 1988; Chikuni, 1989), but there has been no thorough description for any species.

Poltys species have been described from most parts of the old-world tropics and sub-tropics with the greatest number of species from SE Asia. In Australia, nine species of *Poltys* were described from the Australian mainland (eight species from Queensland, one from Western Australia) and one from Lord Howe Island in the Tasman Sea. Simon (1899) suggested several synonymies but none of these are reported by Roewer (1942) or Platnick (2005) and they have not been followed in this study.

Close to Australia, several species have been described from New Guinea and the Moluccas. Unfortunately, *P. sigillatus* Chrysanthus is the only one of these species that can be positively identified. The types of *P. dromedarius* (Bradley) and *P. papuensis* (Bradley) from New Guinea and of *P. moluccum* (Doleschall) from Amboina [Ambon] have not been found. Except for *P.idae* from Borneo there is then a geographical gap in described species northwards to Singapore, the area from where *P. illepidus* was described. From Sumatra northwards into mainland Asia there are then another 16 described species. All of these types are summarized in Appendix 1.

Koch was uncertain of the familial placement of *Poltys* and suggested the eye pattern might align the genus with the "Mithraen" (presumably *Mithras* C.L. Koch species, which are now listed under *Hyptiotes* Walckenaer in Uloboridae). As the genus became better known, its familial affinities were recognized. Simon (1895) placed *Poltys* into his Argiopidae as the nominative member of a new subfamily, the Poltyinae, which also included the genera *Cyphalonotus* Simon, *Homalopoltys* Simon, *Kaira* O.P.-Cambridge and *Pycnacantha* Blackwall. Later in the same work this taxon was demoted to tribal status in the Argiopinae (now essentially the family Araneidae). This tribe is now referred to as the Poltyini to conform to the International Code of Zoological Nomenclature. Informal use of this grouping has continued to the present, but as more becomes known of these genera it now seems unlikely that this is a monophyletic grouping (Smith, 2005).

Aims and scope

The original aim of this study was the taxonomic revision of the Australian *Poltys* species including a phylogenetic analysis and complementary behavioural studies (which will be reported separately). Initially, species separation was problematic due to unexpectedly wide intra-specific variations in abdominal shape (Smith, 2003). Once the specific features were better understood, and as more material became available, it became apparent that most of the northernmost Australian species were also present outside Australia, some as far north as mainland Asia. This meant that the original scope of the study had to be widened to include much more of the SE Asian fauna and many more types needed to be examined.

It was decided not to make any more formal descriptions or redescriptions of species based on females alone. All confirmed Australian species have been matched to males, and most pairings have been confirmed by raising the males from egg sacs. Only a few males are available for study from the SE Asian region and currently, other than the new species described here from New Caledonia, only those recognisable from Australian species can be matched to females. Some characters of a number of named non-Australian species have been figured with a summary of their details to aid future work in this region (Appendix 1, Figs 223–247). Except where somatic details may be diagnostic, only mature types have been illustrated.

A detailed generic description is not usually required for a partial generic revision. It was decided that due to the lack of previous knowledge of males and several instances of misidentification of other genera with *Poltys*, such detail would be useful in this case.

In this paper a revision of all the Australasian *Poltys* species with known males is presented. Support for these species' delimitation is then examined using within and between-species variations in base sequences of a short section from two genes.

Material and methods

Specimen examinations, measurements and drawings were made using a Wild M5 microscope with graticule and drawing attachment. Half-tone drawings were made on coarse-grade coquille board, using a range of graphite pencils and an ink outline. Stipple drawings are of ink onto drafting film. All plates were made up using Adobe Photoshop® 5.0 LE, including the addition of white lines on half-tone drawings. Specimen preparations for scanning electron microscopy (SEM) were either air dried from 70% alcohol (legs), air dried from 100% acetone after dehydration through a series of alcohol solutions (more robust male palps and spinnerets) or dried by critical point drying after the acetone/alcohol series (delicate male palps).

Poltys are often awkward to examine and draw as the legs are often tightly bunched and the dorsally extended abdomens may be difficult to handle. In order to damage no more specimens than necessary, the primary figured female specimens of each species group are the ones that have been used for DNA extractions, so 3–4 legs have been removed from one side (sometimes including coxae on smaller specimens). All lateral views are from the left (image reversed if necessary). On dorsal and ventral drawings any missing coxae were copied in from the entire side to balance the drawing. The point of leg excision is representational. Leg I has been manipulated so that a flat lateral view is shown to illustrate the proportion to the carapace; leg II femur length is in correct proportion to leg I. Legs III and IV are drawn as seen.

The range of abdominal variation within each species may be large but is similar in any one species group. This is illustrated for each group with exemplars drawn from the different species and in addition the abdomen of each holotype is illustrated. The particular abdominal shape shown for any particular species should therefore NOT be considered specifically diagnostic within the group (but see discussion for comments on the *P. columnaris*-group and some other non-Australian species).

Male palpal organs are rather small and details are often difficult to discern under a light microscope. The drawings

Figs 1–4. 1–3: *Poltys illepidus*. 1–2, day-time hiding positions; 3, frontal view showing bowed front tibiae. 4, *P. stygius*, day-time hiding position hanging beneath dead leaf. Arrows on Figs 1, 2 and 4 point to the anteromedial tip of the abdomen.

are intended to convey only the information that can be seen using a standard binocular setup. SEM images are also provided to fill in details. Some palpal characters are rather subtle and the only way to positively identify some species is by direct comparison with other material. To facilitate this, males and females of all the species found in each Australian state will be deposited with the major museum of that state, if none already exists in the collections.

To examine the epigyne of a specimen with a tall abdomen, it is useful to have an examination bowl with a deep layer of substrate such as sand or glass beads so that the apex of the abdomen can be gently buried to hold the specimen in position. It is also useful to have a range of small objects to hand that can be used as supports. Sometimes the posterior epigynal face can be seen without surgery, but often, however, the epigynal plate needs to be lifted or removed. For a brief examination, it is often possible to just lift the epigyne by making a small incision on each side to free it from the epigynal fold. Some epigynes, *P. frenchi* Hogg, in particular, are rather delicate and require extreme caution.

Abbreviations and definitions. For convenience, species are arranged in informal species groups based on morphology. Each grouping appears to comprise two or three sister species, but this relatedness is not tested here. Hence at present the characters given merely serve to "paint

a picture" of the species in question but in the future they may also prove to be useful in a phylogenetic context.

The group containing the type species is treated first, followed by the other groups in alphabetical order. Within each group the nominal species is first (if it is dealt with in detail), others are in alphabetical order.

Abbreviations of institutions and collections. *AM*, Australian Museum, Sydney, Australia; *BMNH*, The Natural History Museum, London, UK; *BPBM*, Bernice P. Bishop Museum, Honolulu, USA; *CLD*, C.L. Deeleman-Reinhold; *HNHM*, Hungarian Natural History Museum, Budapest, Hungary; *JAM*, J. Murphy; *JK*, J. Koh; *MMUS*, Macleay Museum, University of Sydney, Sydney, Australia; *MNHNP*, Muséum national d'Histoire naturelle, Paris, France; *MRAC*, Koninklijk Museum voor Midden Afrika, Tervuren, Belgium; *MSNG*, Museo Civico di Storia Naturale "G. Doria", Genoa, Italy; *NHMW*, Naturhistorisches Museum, Wien, Austria; *NHRM*, Swedish Museum of Natural History, Stockholm, Sweden; *NMV*, Museum Victoria, Melbourne, Australia; *NTM*, Museums and Art Galleries of the Northern Territory, Darwin, Australia; *OUM*, Oxford University Museum, Oxford, UK; *QM*, Queensland Museum, Brisbane, Australia; *RBIN*, Royal Belgian Institute of Natural Sciences, Brussels, Belgium; *RMNH*, National Museum of Natural History, Leiden, The Netherlands; *SAMA*, South Australian Museum, Adelaide, Australia; *WAM*, Western Australian Museum, Perth, Australia; *ZMH*, Zoologisches Institut und Zoologisches Museum der Universität Hamburg, Hamburg, Germany; *ZMUC*, Zoological Museum, University of Copenhagen, Copenhagen, Denmark.

Registration prefixes at Australian institutions. Specimen numbers prefixed *KS* are in the AM, prefixed *N* or *NN* are in SAMA, *S* or *W* are in QM, *WA* are in WAM, and others are as indicated.

Abbreviations of collectors. *G,M&S*: Gray, Milledge and Smith; *HMS*: H.M. Smith; *M&S*: Milledge and Smith; *MRG*: M.R. Gray. Collector's names that only appear once or twice are not abbreviated.

Other abbreviations. *ac*, aciniform spigot(s); *agg*, aggregate spigot(s); *ALE*, anterior lateral eye(s); *ALS*, anterior lateral spinneret(s); *AME*, anterior median eye(s); *BH*, basal haematodocha; *CD*, copulatory duct; *Co*, conductor; *COI*, cytochrome oxidase *c* subunit I; *Cy*, cymbium; *cyl*, cylindrical spigot(s); *DH*, distal haematodocha; *E*, embolus; *FD*, fertilization duct; *fl*, flagelliform spigot; *I, II, III, IV*, Roman numerals used for legs 1–4; *ITS2*, internal transcribed spacer 2; *LLs* and *LsLS*, large-large-small and large-small-large-small (prolateral cheliceral teeth); *MA*, median apophysis; *mAP*, minor ampullate spigot; *MAP*, major ampullate spigot; *mtDNA*, mitochondrial DNA; *nu*, nubbin; *P+TL*, patella and tibia overall combined length, dorsal; *Pc*, paracymbium; *pir*, piriform spigot(s); *PLE*, posterior lateral eye(s); *PLS*, posterior lateral spinneret(s); *PM*, paramedian apophysis; *PME*, posterior median eye(s); *PMS*, posterior median spinneret(s); *S*, stipes; *TA*, terminal apophysis.

Measurements and descriptions. Carapace length ranges are taken from Australian specimens only and are based on all records, or a sub-sample of 20–30 individuals for more numerous species. All measurements are given in millimetres. Sternum and abdominal length measurements are along the centre line and so, for the sternum they start posterior to the labium and for the abdomen they ignore any humeral tubercles. As far as possible, typical specimens have been selected for descriptions but it should be noted that all species are variable in most characters, especially abdominal shape, carapace shape and eye positions, and leg lengths. Many figure references in descriptions are to the typical specimens that are used for the primary figures and so are not actually the specimens being described (see *Material and methods* section). Eyes increase less than other body parts with growth, so larger specimens tend to have smaller eyes relative to carapace length than smaller ones. For this reason eye measurements are not given. Species descriptions do not reiterate the generic description unless there is interspecific variation within a character.

Distribution maps and records. Adults only are included except where a juvenile record is the only occurrence for a state or territory or otherwise extends the recorded range of the species. Records with only a country name and no detailed locality are not included on maps unless there are no others from the area. If such records are used the symbol is arbitrarily placed in the centre of the named area. Records are listed ordered by State or Country, then by locality name for each repository (alphabetically on initials). Type data are given in full, data for other material examined are abridged and only selected records are given for common species (but including any drawn or described specimens). The full list of material examined is shown on maps (exceptions as discussed above). It should be noted that many specimens (both males and females) collected by the author have matured in captivity after the capture date given.

Molecular sequences. Methods are described in the section "Separation of Australian species using molecular characters".

Taxonomy

Genus *Poltys* C.L. Koch

Poltys C.L. Koch, 1843: 97. Type species *Poltys illepidus* C.L. Koch by monotypy. Simon, 1885: 448, 1895: 888; Keyserling, 1886: 123; Pocock, 1900: 235; Rainbow, 1909: 230; Roewer, 1942: 904; Bonnet, 1958: 3746; Barrion & Litsinger, 1995: 579; Platnick, 2005.

Pleuromma Doleschall, 1859: 44. Type species *Pleuromma moluccum* Doleschall. First synonymized by Thorell, 1878: 28.

Cyphagogus Günther, 1862: 2. Type species *Cyphagogus mouhoti* Günther. (Preoccupied in Coleoptera).

Cyphonethis Thorell, 1869: 37. Replacement name for *Cyphagogus*. Not recognized by Simon, 1885: 449, who synonymized *Cyphagogus* with *Poltys*.

Mastigosoma Ausserer, 1871: 817. Type species *Mastigosoma idae* Ausserer. First synonymized by Simon, 1885: 449.

Gerrosoma Bradley, 1876a: 223. Type species *Gerrosoma papense* Bradley. First synonymized by Thorell, 1881: 59, but disputed by Simon, 1885: 449.

Rhyncharachne Bradley, 1876b: 240. Type species *Rhyncharachne dromedaria* Bradley. First synonymized by Thorell, 1881: 59.

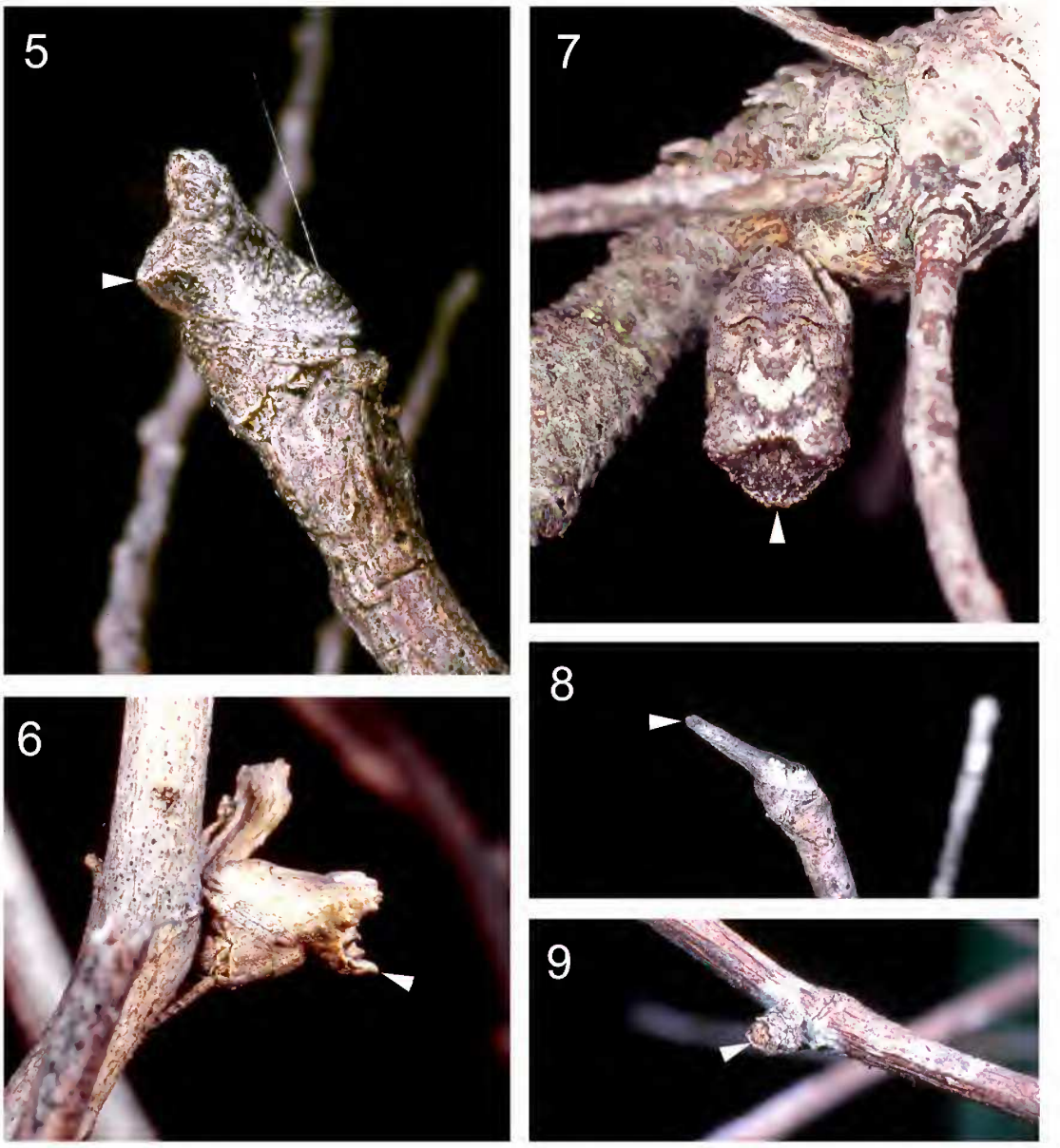
Remarks. The generic synonymies listed above have not been questioned in this work. Only two of the type specimens involved (*P. mouhoti* and *P. idae*) have been located (see

Appendix 1). Although these females share many *Poltys* characters (Fig. 244), these taxa cannot be fully evaluated until males are known. Of the others, the original descriptions and figures do not contradict identification with *Poltys*.

On *Poltys illepidus*: at least six *Poltys* species are now known to occur in the area around Bintang, the type locality of *P. illepidus* (see Appendix 1). Koch's type specimen, from the collection of Herr Professor Reich of Berlin, has not been located, nor apparently has that of *Atea incerta* C.L. Koch, described from material in the same box, which is now listed as *nomen dubium* under *Araneus* Clerk (Platnick, 2005). Even if the *Poltys* type were found, it might not be possible to identify the species, as the "female" specimen was missing its abdomen. Despite this, the identity of the genus itself is not in doubt. The combination of carapace shape, size and eye arrangement is distinctive. It is hoped that future work on the Asian *Poltys* species (or rediscovery of the type) will resolve this issue. For the time being, the species referred to as *P. illepidus* is one of the most common and widespread, has definitely been recorded from the general area of the type locality, and is that which most people associate with the name *P. illepidus* (e.g., Chrysanthus, 1961; Davies, 1988 [female only]). Continuing this association would therefore seem prudent unless better evidence becomes available.

Diagnosis. **Females**. All Australian *Poltys* species are medium to large spiders (carapace length 2.69–8.75) with a distinct eye tubercle and a pear-shaped carapace in dorsal view (Fig. 35). Viewed laterally, the carapace is doubly-domed (Fig. 33). The median eyes form an anterior quadrangle on the eye tubercle, ALE are a variable distance posterior to these towards the base. The PLE are well separated from the ALE on the outer radius of the anterior carapace (Fig. 35). In Asia, some species of the *P. mouhoti*-group have a reduced eye tubercle (as Fig. 244 or shorter), but eye arrangement and carapace shape are still distinctive. *Heurodes* Keyserling (Australian) and *Cyphalonotus* Simon (non Australian) are most frequently confused with *Poltys* but can be separated by the eye positions and genitalia. In *Heurodes*, the lateral eyes are adjacent (the "normal" araneid arrangement). In *Cyphalonotus*, the eyes may be slightly separated and are sometimes on an eye tubercle, but both lateral eyes are on, or at the base of, the eye tubercle (rather than the PLE being far away on the carapace). In both genera the epigyne has a bulbous basal part with a thinner extended scape. *Micropoltys* Kulczyński (northeastern Australia and New Guinea) also have separated lateral eyes but the females are as small as males and have no distinct eye tubercle. **Males**. Small compared to females (carapace length 0.78–1.41); the lateral eye separation is distinctive when combined with the absence of secondary sexual characters such as endite teeth and coxal hooks (Figs 56, 59). The eye tubercle is not always clearly differentiated. *Micropoltys* is similar in size and appearance, but *Micropoltys* have a more complex palpal organ with a large TA, plus endite teeth and coxal hooks. Although sometimes misidentified as *Poltys, Heurodes* and *Cyphalonotus* males are large (almost the same size as females) and also have endite teeth and coxal hooks. Males and females of *Cyphalonotus* and *Micropoltys* are illustrated in Smith (2005); *Heurodes* is illustrated in Davies (1988).

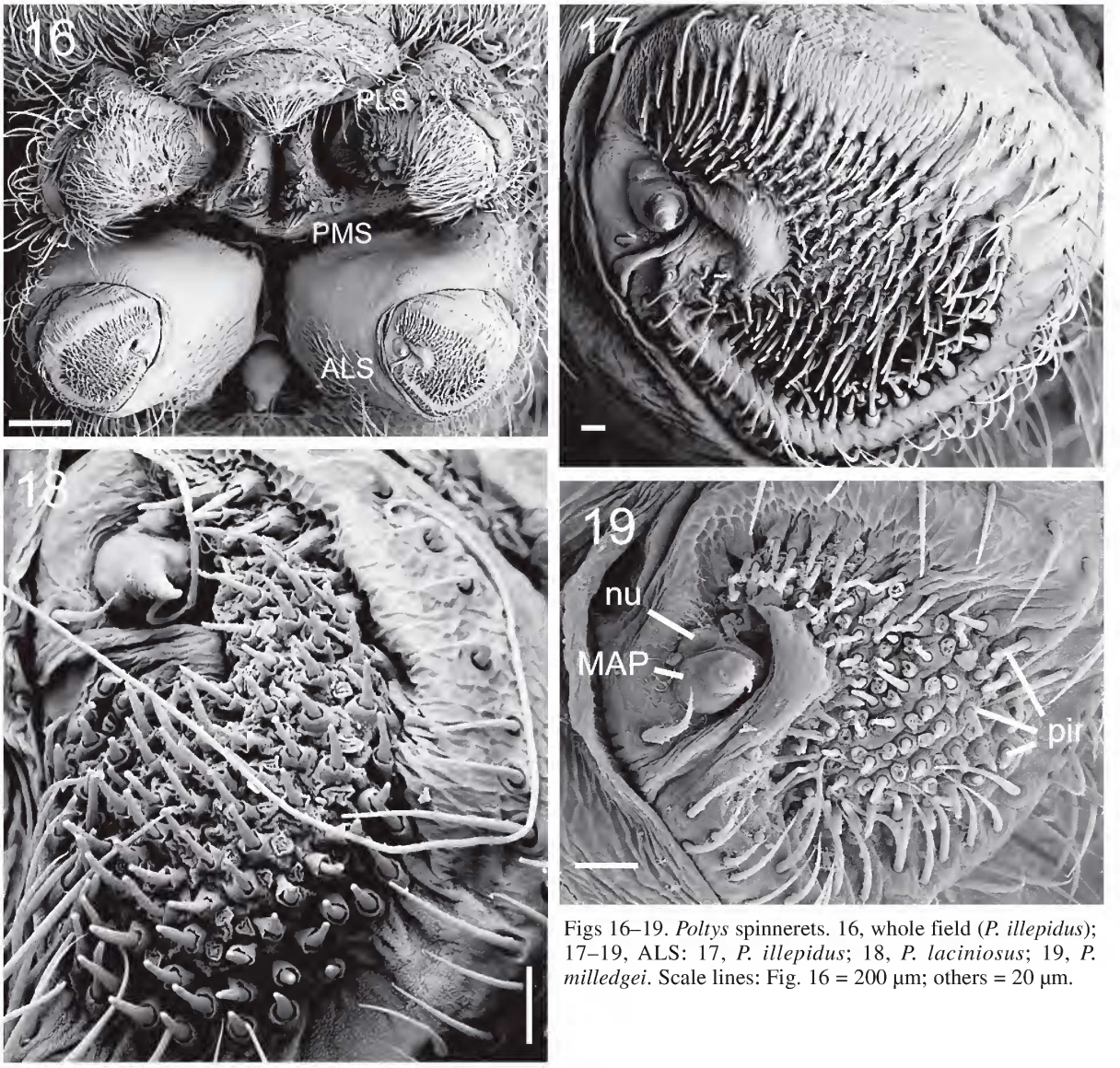
Description (Australian species). **Females**. *Prosoma*. Carapace pear-shaped in dorsal view, usually convex at coxa I (Fig. 35) (except *P. frenchi*, Fig. 130), widest between coxae II and III, longer than wide with a distinct eye tubercle anteriorly. In profile, carapace usually highest immediately anterior to fovea, double-domed (Fig. 69); fovea a deep pit; eye tubercle level to distinctly elevated (occasionally higher than thorax), sometimes with small protrusions above PME (Fig. 174). Eye tubercle and parts of caput hirsute, posterior carapace more or less glabrous (Fig. 69). Chilum two slender curved plates (Fig. 129). Chelicerae robust with three (*P. laciniosus*-group) or four (most other groups) promarginal teeth, few to several retromarginal teeth and a varying number of denticles in the cheliceral groove (Fig. 77). Cheliceral fang well developed, quite long, usually with tips crossed in mouth recess between maxillae. Labium wider than long (Figs 75, 129), strongly rebordered with white margin. Maxillae robust, with serrula, cupping deeply recessed mouth, medial borders white. Sternum cordate with anterior concavity for labium, tip pointed between coxae IV. Sternum carries sclerotized articulating extensions at bases of posterior legs (and sometimes also leg II, Fig. 129). • *Eyes*. Median eyes in a roughly equilateral quadrangle at or near anterior of eye tubercle, widest at either AME or PME (Figs 3, 162); AME often partially or wholly directed ventrally (Fig. 75). ALE on lateral eye tubercle, often partially directed ventrally on small one-sided tubercle; PLE well separated from ALE on lateral anterior carapace, directed posterolaterally. Tapeta in all secondary eyes: PME reduced to a sliver in base of eye-cup, ALE tapetum c. ⅓ in anterodorsal position in cup, PLE c. ¼ in anterior cup. • *Legs*. 1243. Front femora varying in shape from a normal, slightly broadened cylinder (*P. illepidus*-group, Fig. 33) to distinctly expanded dorsoventrally, with greatest diameter ½ to ⅔ distance to apex (e.g., Fig. 73); femur III fairly robust but short, femur IV longer and slender; few macrosetae on dorsal and prolateral faces of femora. Apical and lateral patellar macrosetae sometimes modified by flattening (Figs 37, 123). Anterior tibiae with characteristic shape: in lateral view sinuously curving towards apex (Fig. 33), with a "D" shape in cross-section, in dorsal view also curving laterally (Fig. 3); dorsal surface almost flat with regularly spaced short macrosetae, prolaterally with numerous short and long curved erectile macrosetae that continue to the distal metatarsus (Fig. 73); tibia ventrally smooth and glabrous (this is usually held close against the femur and cephalothorax when in cryptic day-time resting position, Figs 3, 5, 6). Anterior metatarsi gently curved, macrosetal patterns continuing from tarsi but also with paired macrosetae on ventral surface. Tarsi without macrosetae but on legs I and II a prolateral row of slightly stronger setae bear one or more basally notched teeth. One or more nearby hair rows also toothed but these are less specialized. Tarsi III and IV bear similar setae (Fig. 24, example of notched tooth arrowed). Tarsal claws. Three claws, main claws pectinate with 6–8 teeth. Toothed accessory hairs near claws (Fig. 22); on retrolateral tarsus IV the accessory hairs are enlarged but untoothed (not examined on legs II and III) (Fig. 23). Female pedipalps are variable in dimensions, and in development of macrosetae. • *Abdomen*. Certain shapes are characteristic of a particular species group but generally variable within and between species. Often with humps and tubercles and smooth and roughly haired patches. Also often with well-developed small sclerotized plates ("micro-sigillae") scattered over the abdomen surface, especially in



Figs 5–9. *Poltys laciniosus*-group and *P. frenchi*, day-time hiding positions. 5–6, *P. grayi* (5 is holotype); 7–8, *P. noblei* (7, photo: David Hain); 9, *P. frenchi*. Arrows point to the anteromedial tip of the abdomen.

P. illepidus-group and *P. frenchi*-group (Fig. 38). The pedicel is situated in the posterior half of the abdomen, so the abdomen is held at a steep angle overhanging the cephalothorax (Figs 53, 73). Book lung covers yellow with approximately nine main grooves. • *Spinnerets*. Normal araneid conformation (Coddington, 1989; Scharff & Coddington, 1997; Griswold *et al.*, 1998). ALS: MAP and nubbin medial (Figs 16, 19); piriform field widely distributed, but a large variation between checked species with approximately 225 spigots counted in the illustrated *P. illepidus* (Fig. 17), 95 in *P. laciniosus* Keyserling (Fig. 18), and 80 in *P. milledgei* n.sp. (Fig. 19). PMS: all spigots on anterior two-thirds of area; mAP + nubbin posterior; aciniform brush relatively sparse, about 14 spigots, grouped in anteromedial corner (Fig. 20). PLS with basally placed cylindrical spigots, closely grouped triad and approximately 30–40 aciniform spigots (Fig. 21). • *Epigyne*. Short and broad or a longer triangular or diamond-shaped plate (Figs 26, 28, 30, 32). Anterior plate rebordered giving a deep rim around the distal margin and laterally to a varying extent (Figs 46, 195). Most species with a distal bulge at the midline in lateral view (Figs 54, 191), and/or a pair of secondary bulges (Figs 47–48) that may appear as lobes (Fig. 140–141). Posteriorly with a median plate at least basally, reduced to a ridge of variable height away from the base in species with medium–long epigynes (Figs 47, 196); broad and fused with, or closely adjacent to, the lateral plates for much of the length in *P. columnaris*-group (Fig. 105). Foveal shape diagnostic for most species. Glandular spermathecae lie at the base of epigyne just within the abdomen. Copulatory ducts either lost or appearing as a posterior lobe of the spermathecae in the *P. illepidus*-group, with only pores leading away from the visible external parts of the epigyne (Fig. 26). In other groups there are short to medium length copulatory ducts along the lines where posterior lateral plates fuse with the median plate (Figs 28, 30, 32). • *Colour*. Variable. The only fairly consistent areas of colouration are those that are not involved in cryptic

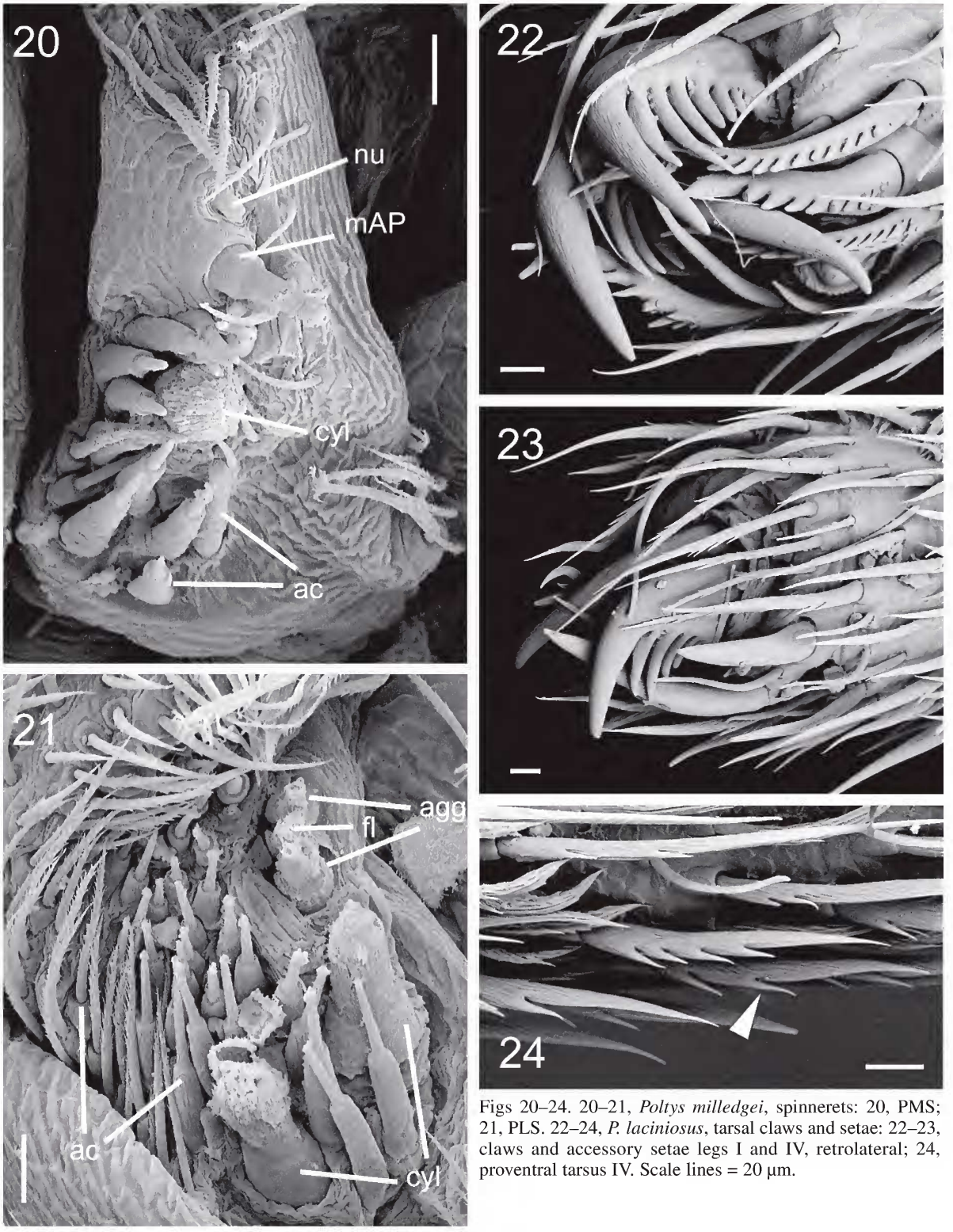
Figs 10–15. 10, *Poltys laciniosus*, in web at night, two eggsacs on twig at left (arrowed); 11, *P. laciniosus*, showing bright bands on anterior femora; 12, *P. frenchi* web of adult female; 13, *P. illepidus*, eggsac attached to dead leaf (photo: Ramon Mascord); 14, *P. milledgei*, eggsac on twig (photo: Carl Bento, Australian Museum); 15, *P. grayi*, eggsac on twig.



Figs 16–19. *Poltys* spinnerets. 16, whole field (*P. illepidus*); 17–19, ALS: 17, *P. illepidus*; 18, *P. laciniosus*; 19, *P. milledgei*. Scale lines: Fig. 16 = 200 µm; others = 20 µm.

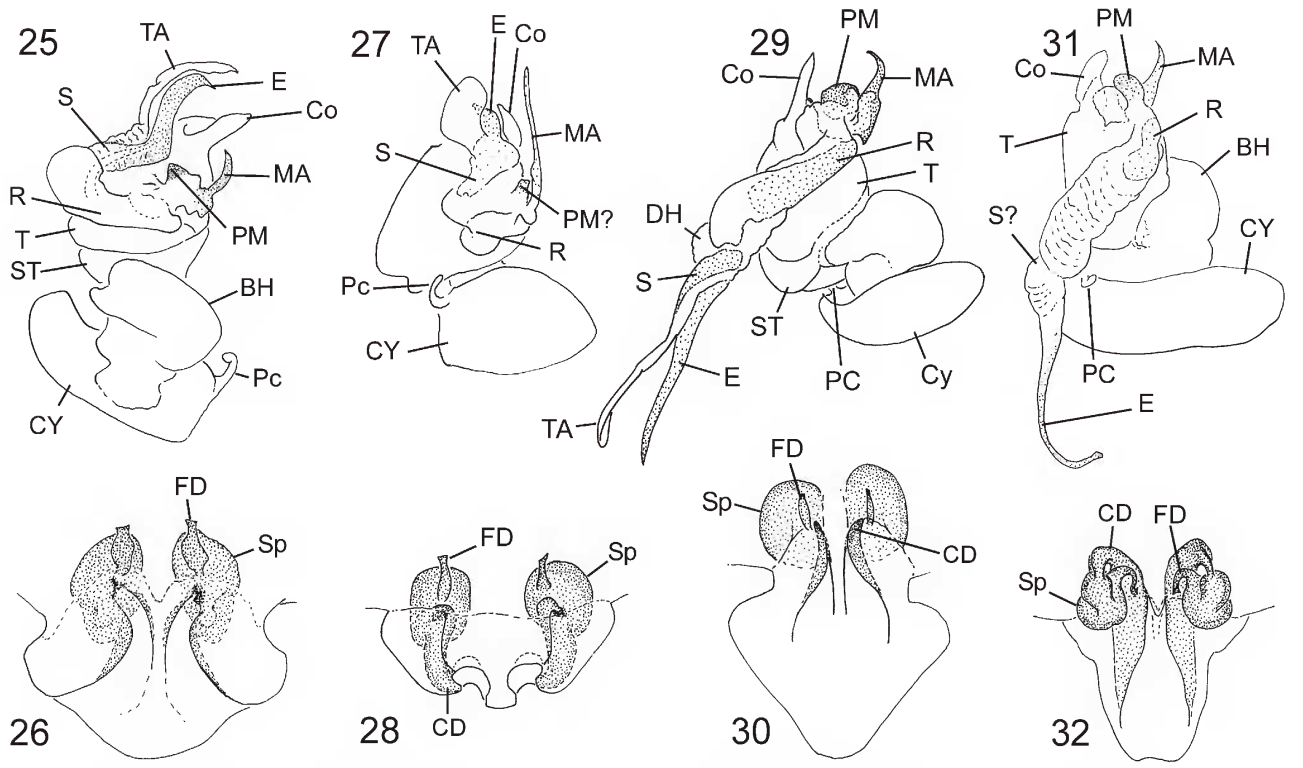
camouflage: most species have at least some black colouration around the secondary eyes, especially on the slightly tubercular lateral eyes; dorsal eye tubercle and adjacent areas of caput usually orange to creamy-yellow, remaining carapace is usually dark in the *P. illepidus*-group and *P. laciniosus*, paler in others; caput hairs always pale, usually appear whitish at least in alcohol specimens; ventral femora of *P. illepidus*-group usually dark with a deep blue refractive shine. The femora of other species groups are pale or yellow–orange contrasting with one or more dark bands, where the blue shine may again be apparent. Green pigments occur in some specimens both on the abdomen and on the legs, most commonly in tropical species but also as paler bluey-green lichen-like patches in southern species. Green pigments quickly break down in alcohol.

Males. Many features are like juvenile females at a similar stage of development (2–4 moults). In somatic characters, early maturing males can be quite different from late maturing males of the same species (e.g., as shown Figs 203–206). • *Prosoma*. Carapace. Mostly pear-shaped in dorsal view, widest between coxae II and III, longer than wide with a poorly to well-defined eye tubercle anteriorly (Figs 58, 98), sometimes with small protrusions above PME (Fig. 198). In profile (Fig. 56) carapace more-or-less level or highest at eye tubercle. Chelicerae similarly proportioned to female. Cheliceral fangs short to medium. Labium and maxillae similar to female with white or pale edges, endite tooth absent (Fig. 59). Sternum similar shape to that of female but reinforced by sclerotization that continues around between coxal bases to meet similar continuations from areas dorsal to the coxal bases. • *Eyes*. As female but ocular area more compact and eyes relatively larger (Fig. 59) and rather variable in relative sizes. • *Legs*. 1243. No coxal hooks. Femora almost straight in most species, slightly broadened in *P. columnaris*-group (Figs 95, 100); macrosetae as female. Patellar macrosetae as female. Anterior tibiae almost straight (Fig. 56); dorsal macrosetae may be flattened as on patellae (Fig. 99); prolaterally with a few macrosetae. Larger males, which have been through more moults, have a few more macrosetae (Fig. 207), but juvenile females are developing mature female-like legs with more macrosetae by this stage. Metatarsi also with only a few macrosetae. • *Abdomen*. Book lung covers smooth. Abdominal shape similar to females of similar size, i.e. some differentiation of shapes developing but still basically ovoid



Figs 20–24. 20–21, *Poltys milledgei*, spinnerets: 20, PMS; 21, PLS. 22–24, *P. laciniosus*, tarsal claws and setae: 22–23, claws and accessory setae legs I and IV, retrolateral; 24, proventral tarsus IV. Scale lines = 20 µm.

(Figs 199, 202). • *Palpal organ*. A more or less full complement of typical araneid sclerites is present in most species but some structures (especially TA where present) are rather simplified. Expanded views of the Australian species groups are shown in Figs 25, 27, 29, 31. Of the tegular sclerites, all species have a long slender MA with a broad base (Figs 70, 208); a conductor is present that is reduced in the *P. columnaris*-group but is sturdy in others (Figs 118, 218); and a third sclerite is labelled here as a paramedian apophysis (PM). This is closely associated with the base of the MA and is possibly a separated section of that sclerite. The PM is well developed in *P. frenchi* and *P. laciniosus*-groups (Figs 125, 219), is smaller in the *P. illepidus*-group (Fig. 70) and extremely small or absent in *P. columnaris*-group (a small sclerotized patch with label "PM?" on Fig. 27). This sclerite appears to be homologous between these *Poltys* species-groups, but is not necessarily homologous to the PM of other taxa (see Scharff &



Figs 25–32. *Poltys* genitalic characters, expanded male palp and epigyne internal structure, posterior view. 25–26, *P. illepidus*; 27–28, *P. milledgei*; 29–30, *P. frenchi*; 31–32, *P. laciniosus*. Not to scale.

Coddington, 1997, for a discussion). In the embolic division all taxa have a radix; a stipes and distal haematodocha is definitely present in *P. illepidus* and *P. frenchi*, probably also in other species (Figs 25, 29, 67); a long, narrow TA that widens to a lamina distally is present in *P. illepidus*-group and *P. frenchi*-group (Figs 25, 29, 126), is shorter but broad in *P. columnaris*-group (Figs 27, 118) but absent in *P. laciniosus*-group (Figs 31, 218); the embolus varies between a short, stout rod in *P. columnaris*-group (Fig. 118) to a long, wire-like, grooved structure in *P. laciniosus*-group (Fig. 218). The paracymbium is a well-developed hook (Fig. 25). Femoral tubercles are absent. Macrosetae are absent from the palpal patella. • *Colour*. Less variable than females. Most species have at least some black colouration around the secondary eyes. Prosoma and legs mostly pale olive/brown, usually with black markings in centre of carapace and orange or yellow on the dorsal eye tubercle. Distal metatarsi and tarsi usually pale with dark rings. Larger males usually more strongly coloured than smaller specimens. Abdomens a pattern of brown/grey and black on white.

Biology. Most observations have been carried out on the *P. laciniosus*-group; a more detailed account will be provided separately (Smith, unpublished data). Except for adult males, all Australian species of *Poltys* make a web at night, which is usually ingested around dawn. The sticky spirals and radii are closely placed (Figs 10, 12). Moths are a major prey item, but other insects are also taken. The spiders seem to prefer openings in the vegetation, which may form natural flight corridors for moths and other prey. Webs have been recorded at heights between 0.2 m to around 4 m from the ground. The daylight hours are spent resting in a cryptic position on a nearby twig, tree-trunk, in low herbage (Figs 1–2, 3–9) or in a curled leaf (Robinson *et al.*, 1974). Dead twigs are preferred, especially by southern Australian species, but tropical species are more frequently associated with living vegetation. Egg sacs are laid on twigs or leaves (Figs 10 (arrowed), 13–15).

Distribution. *Poltys* species are found from equatorial western and southern Africa through southern Asia and south to mainland Australia, north to Japan and on at least some southern Pacific islands. Within Australia half of the species are only present in the far north. No *Poltys* have been recorded from either Tasmania or New Zealand.

Relationships. Within the Araneidae, *Poltys* appears to be a rather uniquely derived taxon with no close sister groups yet identified. Data from a study using the araneid matrix developed by Scharff & Coddington (1997) suggest that *Poltys* is most likely placed in the basal araneines and may be related to some or all of the taxa from Scharff & Coddington's "*Hypsosinga* clade" (Smith, 2005). As reported, however, by Scharff & Coddington and corroborated by another study based on this data set, some elements in the basal Araneidae are rather labile, especially when additional taxa are added (Kuntner, 2002). In particular, there is some equivocal evidence with respect to the relationships between argiopines and the basal araneines. For instance, the apparently distinctive character seen on femur IV of *Poltys elevatus* Thorell (Fig. 243) is also present in *Caerostris* Thorell (Grasshoff, 1984), which is an "argiopoid" genus; Scharff & Coddington commented that the "argiopine clade" genera frequently appeared in the basal "araneines" in their data set; Smith (2005) found that *Arachnura* Vinson and *Witica* O.P.-Cambridge frequently moved into this area. The placement of *Poltys* in the basal araneines should therefore be considered provisional.

Key to Australian *Poltys* species

Note that some coloration characters are good for recent specimens in alcohol but may be confusing for older material. Unfortunately, due to intraspecific variation in somatic morphology, most key characters are genitalic.

1 Male 2

—— Female 9

2(1) TA present in palp; embolus fairly stout; PM absent–small and does not project dorsally between MA and conductor (Fig. 61–62), or if PM large then a rounded curved plate (Fig. 153) 3

—— TA absent from palp; embolus long and thin with groove (Fig. 209); PM heavily sclerotized and projecting between MA and conductor like a clenched fist (Fig. 209) ..... (*P. laciniosus*-group) 6

3(2) TA of palp flanks embolus retrolaterally, both more-or-less equal length; conductor large (Figs 61, 154). Anterior eye tubercle gently curved between median eyes, not obviously extended to a blunt point (Fig. 150) 4

—— Visible part of palp TA dorsal to embolus (Fig. 108); conductor reduced and displaced towards MA, beneath embolus (Fig. 108). Eye tubercle long and ends in blunt point (accentuated by tufted setae) between median eyes (Fig. 98) ..... (*P. columnaris*-group) 8

4(3) Embolus and TA arise retrolaterally in palp, not obscured by cymbium (Fig. 154); PM a large curved plate (Fig. 153). Eye tubercle well defined, narrow at base in lateral view (Fig. 148); carapace creamy-white, bright yellow–orange on dorsal eye tubercle; sternum pale with dark border (NE Qld) ..... *P. frenchi*

—— Embolus and TA origin in palp obscured by cymbium (Fig. 63); PM an angular sclerotized bump (Figs 61–62). Eye tubercle short and broad; carapace and sternum usually olive-brown (usually with some orange on eye tubercle) (Figs 56, 58) ..... (*P. illepidus*-group) 5

5(4) Embolus sharply curved in prolateral view of palp (Figs 61, 68) ..... *P. illepidus*

—— Embolus longer and more openly curved (Figs 64, 70) ..... *P. stygius*

6(2) Palpal conductor strongly twisted towards the prolateral (Figs 209, 219); embolus long and strongly curved distally, curve radius usually outside cymbium in ventral view (Fig. 209); usually with well-developed protrusions above PME on dorsal eye tubercle (Figs 200–201) ..... *P. laciniosus*

—— Palpal conductor less twisted, more or less directed apically; embolus shorter and gently curved, radius usually within cymbium in ventral view (Figs 212, 215); with or without protrusions above PME on dorsal eye tubercle 7

7(6) Tip of embolus with large translucent but strongly reflective flange (Fig. 215 arrowed, 220). Protrusions above PME variable (eastern coast of Australia) ..... *P. noblei*

—— Tip of embolus with only small flange or barb (Figs 212, 222). Without protrusions above PME (Lord Howe Island) ..... *P. grayi*

8(3) Eye tubercle massive, clypeus >1× AME (Figs 95, 98), usually with leaf-shaped macrosetae on distal patellae (Fig. 99) (northeastern Queensland) ..... *P. jujorum*

—— Eye tubercle less massive, clypeus <1× AME (Figs 100, 102); often with elongate flattened macrosetae on distal patella (Fig. 103) (northern NT and Kimberley) ..... *P. milledgei*

9(1) Epigyne widest point not at base, or if basal, then much wider than long (Figs 46, 104). Four prolateral cheliceral teeth (alternate large small large small—LsLs, Fig. 44) 10

—— Epigyne widest at base, usually long (Fig. 182). Usually only three prolateral cheliceral teeth (missing first small tooth—LLs, Fig. 163) ..... (*P. laciniosus*-group) 13

10(9) Epigyne much wider than long; foveae rounded pockets (Fig. 105). Eye tubercle long and ends in blunt point between median eyes (accentuated by tufted setae) (Fig. 84). Glossy black maculae on dorsal abdomen just anterior to spinnerets (Fig. 94) ..... (*P. columnaris*-group)..... 15

—— Epigyne as wide as long or up to 2× wider; foveae elongate, more-or-less open (Figs 51, 139). Anterior eye tubercle gently curved between median eyes, not obviously extended to a blunt point (Fig. 130). Dorsal abdomen without glossy black maculae 11

11(10) Epigyne spade-like (as in cards), often only lightly sclerotized and delicate, widest point at less than half length (Figs 138, 140); foveae wide and shallow (Figs 139–140). Eye tubercle well defined; carapace usually pale creamy-grey (Figs 127, 130) (northeastern Queensland) ..... *P. frenchi*

—— Epigyne widest point usually at half length or further, spade to fan-shaped; foveae narrow and angled or wide and deep (Figs 46–55). Eye tubercle broader at base; carapace usually dark (except variable amount of orange–yellow on and posterior to eye tubercle) (Figs 33, 35) ..... (*P. illepidus*-group) 12

12(11) Epigynal foveae narrow and often boomerang-shaped; median plate and ridge often quite short (Figs 47, 49–51) ..... *P. illepidus*

—— Epigynal foveae wide and deep, often paddle-shaped; median plate and ridge often longer, extending more deeply into epigynal groove (Fig. 53, 55) ..... *P. stygius*

13(9) Epigyne tip broad and bluntly rounded (but rim often translucent and may confuse the outline) (Figs 182, 184); median ridge strongly reduced away from base (less so in Kimberley specimens), producing a single large fovea (Figs 183, 185, 188). Carapace dark; usually with well-developed protrusions above PME on dorsal eye tubercle (Figs 159, 174) ..... *P. laciniosus*

—— Epigyne tip bluntly to sharply pointed (but some exceptions) (Figs 189, 195); median plate continues from base as a strong ridge, producing two distinct foveae (Figs 192, 194). Carapace fuscous to creamy-white; with or without protrusions above PME on dorsal eye tubercle (Figs 172–173) 14

14(13) Epigyne margins converge almost straight from base to tip, forming neat triangular plate, tip often quite acute (Figs 193, 195). Protrusions above PME variable (eastern coast) ..... *P. noblei*

—— Epigyne margins usually parallel near base before converging towards tip, tip usually a rounded point (Fig. 189). Without protrusions above PME (Fig. 175) (Lord Howe Island) ..... *P. grayi*

15(10) ALE almost midway between median eyes and PLE (Fig. 85) (northeastern Queensland) ..... *P. jujorum*

—— ALE distinctly closest to median eyes (Fig. 90) (northern NT and Kimberley) ..... *P. milledgei*

The *Poltys illepidus* species group

This group contains the "typical" species that are most commonly associated with the name *Poltys*. In Australasia at least two identifiable named species are found: *P. illepidus* and *P. stygius* Thorell. Both occur from Australia to the Asian mainland and a third, which may belong to this group, *P. pannuceus* Thorell, is recorded from Sumatra to Burma (see Appendix 1). Other species that are unmistakably of this group are found from Africa to Japan and the Caroline Islands (females in BPBM). Female characters that unite the group include a relatively broad abdomen, a low broadly domed carapace with medium to short eye tubercle, long quite slender legs (with less broadening of the femora than is seen in *P. columnaris*-group, for instance), and the epigyne well developed into a broad fan-shaped plate. In the two Australian species, the posterior lateral epigynal plates are relatively flat and there are no obvious copulatory ducts leading off the foveae. The internal epigynal structure of *P. pannuceus* has not been investigated but externally it appears intermediate between these species and the *P. columnaris*-group (Fig. 247). Males are less easily differentiated from those of some other groups, but the eye tubercle is broad and poorly defined and the palpal organ has a long thick embolus, originating dorsally, and a well-developed TA. A male of unknown species, but apparently belonging to the *P. illepidus*-group, has been examined from Genting, Malaysia (JAM 19143).

The two Australian species are of similar appearance and can be difficult to separate, even using genitalia, without side-by-side comparison. They are, however, well separated genetically (in the COI gene) and the egg sacs are different in colour.

Poltys illepidus C.L. Koch

Figs 1–3, 13, 16–17, 25–26, 33–41, 46–51, 56–63, 67–69, 71.

Poltys illepidus C.L. Koch, 1843: 97, fig. 821. Female(?) holotype, "East India, Singapore, Bintang"; not located. Simon, 1885: 448, 1895: 892. Chrysanthus, 1961: 211. Davies, 1988: 316, female only. The specimens discussed or figured by Pocock (1900: 236), Chikuni (1989), Barrion & Litsinger (1995: 579), and Ogasawara (2000) require confirmation, see below.

Poltys coronatus Keyserling, 1886: 128, fig. 10. Female holotype from Cape York Queensland, Australia; "in Bradley's collection", not located. **New synonym**.

Poltys keyserlingi Keyserling, 1886: 129, pl. 10, fig. 3. Juvenile holotype from Gayndah, Queensland, Australia; in ZMH, examined. **New synonym**.

Poltys multituberculatus Rainbow, 1898: 82, pl. 18, fig. 2. Female holotype from Cooktown, Australia; in AM, KS8696, examined. Rainbow, 1916: 118. **New synonym**.

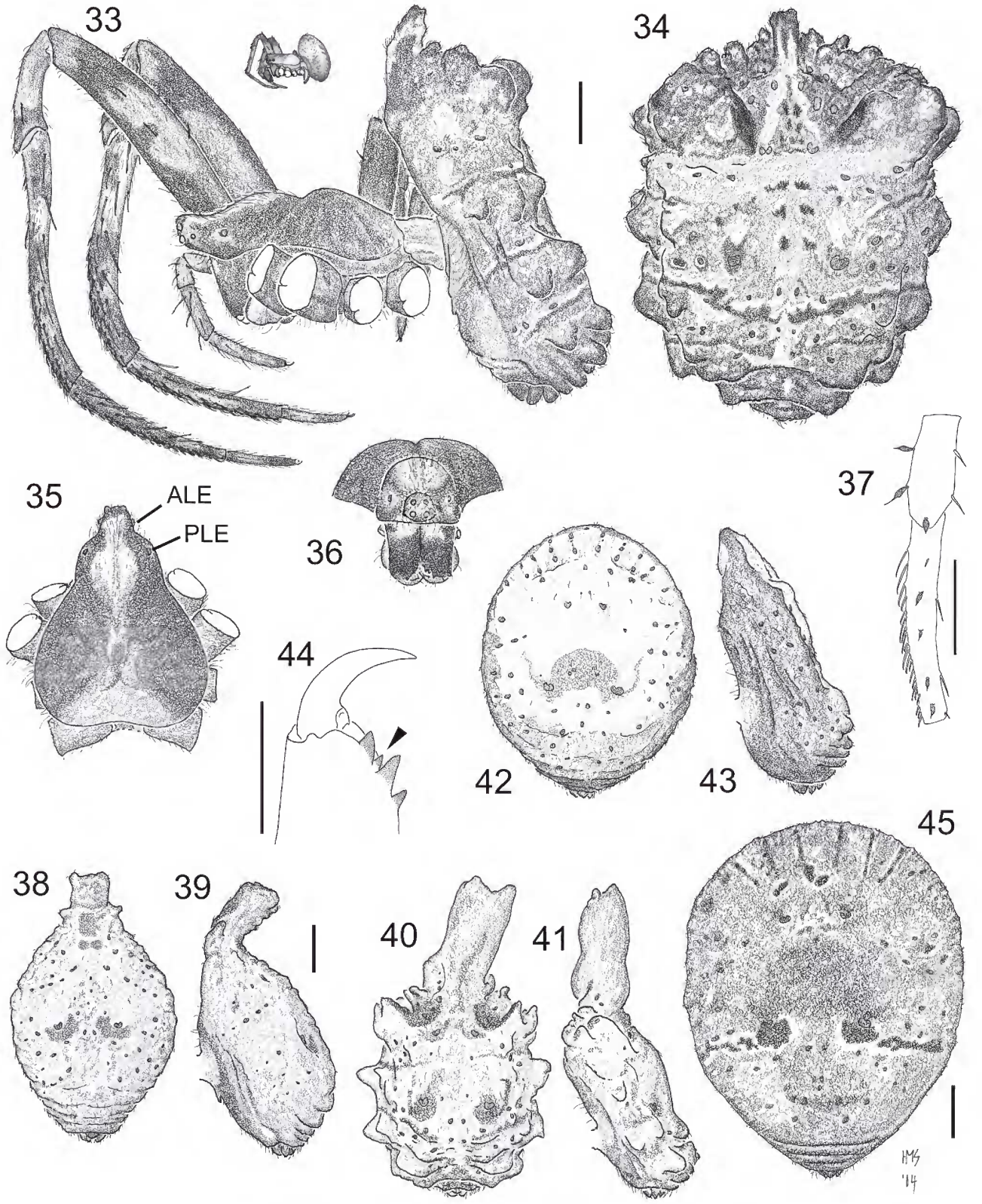
Poltys penicillatus Rainbow, 1920: 249, pl. 29, fig. 57. Female holotype from Lord Howe Island, Australia, Dec 1915–Jan. 1916, A.M. Lea; in SAMA, N1981313, examined. **New synonym**.

Remarks. *Poltys keyserlingi* and *P. coronatus* Keyserling were tentatively synonymized with *P. illepidus* by Simon (1899). Only Bonnet (1958), however, accepted these synonymies so Platnick (2005) has been followed and these are considered new synonymies here. Despite the type of *P. keyserlingi* being a juvenile, only one species in the *P. illepidus*-group has been recorded from SE Queensland, where this specimen was collected, so it seems a reasonable assumption. *Poltys coronatus* also cannot be identified with absolute certainty as Keyserling only figured the anterior view of the epigyne; but it is more likely to be this species than *P. stygius*.

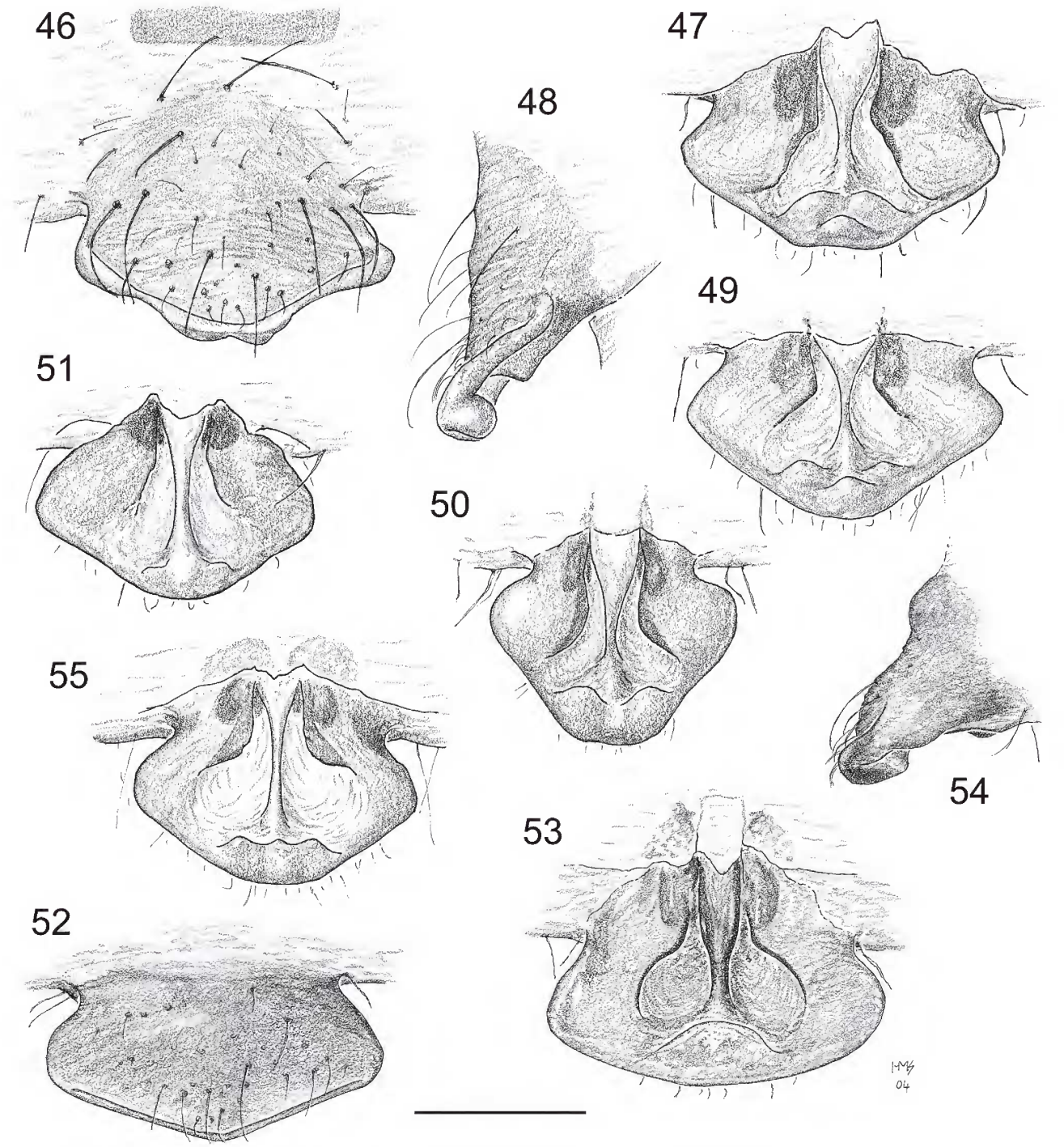
The type of *P. moluccum*, which was also synonymized with *P. illepidus* by Simon (1885), has not been located. However both the figures and the described habit suggest it is not *P. illepidus* as described here. (See also under *P. frenchi*).

Females previously identified as *P. illepidus* have been collected from several areas that border the geographical range accepted here. These require males for verification as the epigynes are consistently outside the range of variation seen in areas where males have been checked. For instance, while the specimen redescribed by Barrion & Litsinger (1995) from the Philippines has not been examined, two other specimens from this area (ZMUC, the epigynes of which could be interpreted as the illustration given) are more likely a separate species. Several specimens from India and Sri Lanka (as discussed by Pocock, 1900) have also been examined and again are most likely different. The Japanese species illustrated by Ogasawara (2000) and identified as *P. illepidus* also does not appear to fit within the species as recognized here, and is probably the same species that is photographically illustrated by Chikuni (1989). Chikuni's male is certainly from the *P. illepidus*-group but the palpal organs are so similar between species it is not possible to ascertain the species without comparing specimens.

Selected material examined. AUSTRALIA: NEW SOUTH WALES: ♀ S42578, Lismore, 28°49'S 153°16'E, 26 Jun. 1961. NORFOLK ISLAND: ♀ KS33926, Norfolk Island, 29°05'S 168°00'E, 17 Feb. 1938; ♀ KS34803, Point Howe, 29°05'S 168°00'E, 3 Aug. 1992. NORTHERN TERRITORY: ♂ KS55734, Darwin, East Point, 12°25'S 130°49'E, 21 May 1999; ♀ KS55732, Litchfield NP, Florence Falls, 13°09'S 130°46'E, Aug. 1998; ♀ S42523, West Alligator Mouth, 12°11'S 132°16'E, 22 Jul. 1979; ♀♀ WA98/1985–86, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992. QUEENSLAND: ♀ KS33923, Cairns District; ♀ KS33927, Cooktown, 15°28'S 145°15'E; ♂ KS58019, near Dalrymple NP, 19°49'29"S 146°03'48"E, 12 May 2000; ♀ KS33929, ♂ KS73156, Edmonton, 17°01'S 145°44'E, 14 May 1972 and 20 Sep. 1976; ♀ KS90970, 4.3 km W of junct. Hopevale & Lakefield NP rds, 15°18'26"S 145°00'48"E, 17 May 2000; ♂ KS58028, 9 km S of Ilbilbie, 21°47'05"S 149°22'12"E, 26 May 2000; ♂♀ KS70353–54, 7.8 km E of Lakeland, 15°49'59"S 144°53'41"E, 15 May 2000; ♂ KS58025, N of Marlborough, 22°41'08"S 149°37'20"E, 26 May 2000; ♂ KS58020 nr Mt Elliot NP, 19°23'50"S 147°00'54"E, 25 May 2000; ♀ KS90971, Rockhampton, Kershaw Gardens, 23°21'36"S 150°31'02"E, 27 May 2000; ♂♀ KS58034–35, Rockhampton, Naughton St, 23°22'08"S 150°29'11"E, 26 May 2000; ♀♂ KS75537–38, Trinity Park, track to Earl Hill via Reed Rd, 16°47'59"S 145°42'33"E, 6 Jan. 2002; ♀ KS86258, ♂ KS86253, Trinity Park, 16°48'S 145°42'E, 17–18 Sep. 2003; ♀ (MMUS), Caloundra, 26°48'S 153°08'E, 15 Jun. 1941; Beaudesert, 27°59'S 152°59'E, 29 Jun. 1980; ♀ S20786, Chelmer, Brisbane, 27°30'S 152°58'E, 2 Dec. 1992; ♀ S42575, Bundaberg, 24°52'S 152°21'E, 11 May 1962; ♀ S25387, Deepwater NP, 24°18'S 151°56'E, 26 Sep. 1992; ♀ S42530, Flinders Is, 14°10'S 144°15'E, 18 Aug. 1979; ♀ S42572, Hammond Is, Torres Strait, 10°32'S 142°12'E, 8 Jul. 1974; ♀ S42623, Jardine River, Cape York, 11°18'S 142°37'E, 28 Aug. 1985; ♀ S42549, Magnetic Island, 19°08'S 146°50'E, Jun. 1965; ♀ S42568, Mt Cook, NEQ, 15°30'S 145°16'E, 12 Nov. 1975; ♀ S42563, Port Stewart, 14°04'S 143°01'E, 23 May 1973; ♀ S42602, Stradbroke Is, 27°36'S 153°27'E; ♀ S42538, Taringa, 27°29'S 152°59'E, 19 Oct. 1923; ♀ S42573, Terry Beach, Prince of Wales Island, 10°41'S 142°04'E, 2 Jul. 1976; ♀ S42531, Toowoomba, 27°33'S 151°57'E, 26 Mar. 1980. WESTERN AUSTRALIA: ♀ KS55746, King Leopold Range, Silent Grove camp site, 17°04'S 125°14'E, 5 Jun. 1999; ♀ NN12182, Cape Wellington, 15°09'S 124°50'E, 17 Jul. 1999; ♀ NN12181, Careening Bay, 15°06'S 125°00'E, 22 Jul. 1999; ♀ NN12184, Roebuck Bay, Broome, 17°58'34"S 122°13'50"E, 10 Jul. 1998; ♀ WA99/244, Barrow Island, Mattress Point, 20°44'43"S 116°28'27"E, 29 Oct. 1998; ♀ WA99/243, Derby, 17°18'S 123°37'E, 17 Sep. 1998; ♀ WA98/1969, Theda Pass campsite, 14°47'S 126°38'E, 13 Jun. 1992. INDONESIA: WEST PAPUA: ♀ (HNHM), Enarotali, 13 Jul. 1962; ♀♀ 8180 (RMNH), Merauke, 1956–57 (illustrated by Chrysanthus, 1961). JAVA: ♀ 6087 (MNHNP), "Savu"; ?♀ 192/1025 (NHRM), Sindanglaya; ♀♀ 20.305 (NHMW) Krakatau: Lang Island; ♀♀ (3) (RMNH), Surabaya, 1933–



Figs 33–45. *Poltys illepidus*-group, female characters. 33–41, *P. illepidus*, 42–45, *P. stygius*. 33, female general lateral view with male at same scale; 34, abdomen, dorsal; 35, carapace and coxae, dorsal; 36, frontal carapace and chelicerae; 37, left patella and tibia I of a juvenile female showing flattened macrosetae; 38–43, examples of variation in abdominal shape seen in *P. illepidus-group*, dorsal and lateral; 44, left chelicera and fang, prolateral. 45, *P. stygius*, dorsal abdomen of holotype. Scale lines: Figs 33–36, 38–43, 45 = 2 mm; Fig. 37 = 1 mm; Fig. 44 = 0.5 mm.



Figs 46–55. *Poltys illepidus*-group epigynes. 46–51, *P. illepidus*: 46–48, anterior, posterior, lateral; 49–51, examples of variation, posterior views (51, type of *P. penicillatus*). 52–55, *P. stygius*: 52–54, holotype, epigyne anterior, posterior and lateral; 55, variant, posterior. Scale line = 0.5 mm.

38. LOMBOK: ♂♀ (RMNH ex coll. CLD), Kute, 12–14 Jan. 1990 & 8–19 Feb. 1990. SUMATRA: ♀ 20.304 (NHMW), Medan. MALAYSIA: PINANG: ♂ 8313 (JAM), Penang, 13–16 Aug. 1979. PAPUA NEW GUINEA: CENTRAL: ♀ 20.303 (NHMW), Yule Island. EAST SEPIK: ♀ KS8015, Kairiru Island, near lake, 3°20'S 143°33'E, 23 May 1976. MOROBE: ♀♀ N1998780–81, Lae, 6°45'S 147°00'E, Jul. & Aug. 1954. SOLOMON ISLANDS: CENTRAL ♀ (BMNH), Tulagi. THAILAND: ♀ 1968.2.20.3 (BMNH), Thailand, 17 Apr. 1961; ♀ 7615 (MNHNP) "Bankok".

Reared specimens deposited in Australian museums: ex♀ KS86257, QLD, Trinity Park, N side of Moores Gully, "The Haul" Rd, 16°48'S 145°42'E, 17 Sep 2003, M&S: ♂ to SAMA NN21923; ♂ to WAM T62876; ex♀ KS86259, QLD, Trinity Park, S side of Moores Gully 16°48'S 145°42'E, 18 Sep 2003, M&S: ♂ to QM S66571; ♂♀ to NTM; ex♀ KS58036, QLD, Rockhampton, Kershaw Gardens, 23°21'S 150°31'E, 27 May 2000, M&S: ♂ to QM S66572.

Diagnosis. Females. From other species groups by fan-shaped epigyne (Fig. 46), broad, low, darkly coloured carapace (Figs 35–36), no or little broadening of front femora (Fig. 33) and relatively broad, rounded abdomen (Figs 34, 38–41). From *P. stygius*: epigynal foveae relatively narrow and often boomerang-shaped (Figs 49–51); posterior

lobes of spermathecae often visible level with or distal to the margin of the epigynal furrow in posterior view (Figs 47, 49–50). **Males**. From other species groups except some *P. laciniosus*-group specimens by short, poorly defined eye tubercle (Figs 56, 58), from *P. laciniosus*-group by presence of TA in palpal organ (Fig. 62). From *P. stygius*: difficult without direct comparison, but *P. illepidus* have a shorter, more sharply curved embolus and a shorter conductor (Figs 61–63, 68).

Description. Female. Carapace length range 4.17–8.75. As commented above, the holotype has not been located. The figured female is used as an exemplar. *Drawn specimens* Figures: 26, KS33929; 33–36, KS86258 (male from Fig. 56); 37, AM juvenile ex Cooktown; 38–39, KS33929; 40–41, KS33923; 46–47, S20786; 48, KS75537; 49, KS90970 (DNA spec.); 50, KS55732 (DNA spec.); 51, N1981313 (type of *P. penicillatus*).

Female KS86258. *Prosoma*. Carapace: length 7.33, width 5.83, height 1.92; dome broad and low (Fig. 36); eye tubercle distinct but broad basally both in dorsal and lateral views (Figs 33, 35). Chelicerae: paturon with 4 promarginal teeth (as *P. stygius*, Fig. 44). Labium: length 0.86, width 1.27. Sternum: length 2.86, width 2.98; deeply indented anteriorly for labium; sternal extensions at bases of legs II–IV. • *Eyes*. (Figs 33, 36), AME>PME=PLE≥ALE; ALE c. 1× its own diameter from AME, ventral margin of ALE is level with mid point of AME. • *Legs*. (Figs 33). P+TL I: 11.50, II: 10.50, III: 6.83, IV: 8.42; front femora only slightly broadened and usually at greatest diameter at, or basal to, mid-point of length; patellal and tibial macrosetae not flattened (but may be in juveniles, e.g., Fig. 37, and adult females from SE Asia). • *Abdomen*. (Figs 33–34). Length 13.33, width 10.42; equally broad at humeral and posterior tubercles; "microsigillae" well developed. • *Epigyne*. A broad fan-shaped plate, widest point at about half length (Fig. 46); foveae form narrow–medium width grooves, partly covered basally, separated by a strong median ridge (Fig. 47); rim well formed on distal margin of anterior plate, distinct to the broadest point, expanding posteriorly into bulges near distal tip (Figs 46–48); posterior lobe of spermathecae visible through posterior cuticle level with the external edge of the epigynal groove (Fig. 47); no copulatory ducts visible (Fig. 26); spermathecae separated by half a spermatheca width or less. • *Colour in alcohol*. Carapace mostly rich dark brown with red pro-foveal suture; dorsal caput, eye tubercle and patches anterior to PLE orange; caput hairs golden. Chelicerae with basal yellow patch, rest brown, darkening distally. Labium and maxillae orange-brown. Sternum yellow anteriorly, otherwise brown. Pedipalps yellow with black markings. Femora I and IV mostly black–brown with orange patches and a strong blue shine on glabrous areas; femur II slightly lighter; III mostly yellow with dark distal band; all distal legs mottled orange-brown–black. Abdomen ventrally black around pedicel, ringed by white then dorsal colouration; dorsally a rich tapestry of browns, yellow–orange and black; patterns accentuated by tufts of coloured setae.

Male. Carapace length range 1.00–1.27. *Drawn specimens* Figures: 25, KS58033; 56–63, KS86253.

Male KS86253. *Prosoma*. Carapace: length 1.14, width 0.84, height 0.39; eye tubercle poorly defined, broad and almost without any dip between caput and eye tubercle in lateral view (Figs 56, 58–59). Labium: length 0.10, width 0.19. Sternum: length 0.53, width 0.49. • *Eyes*. (Figs 56, 59). AME≥PME>PLE≥ALE; ALE c. ⅓× its own diameter from AME; ventral margin of ALE is at mid point of AME. • *Legs*. (Fig. 56). P+TL I: 1.35, II: 1.25, III: 0.69, IV: 0.94; distal patellal and tibial macrosetae of legs I and II flattened into leaf-like blades (Fig. 60). • *Abdomen*. (Figs 56–57) Length 1.57, width 1.12; a rather skewed ellipsoid, widest point near apex. • *Palpal organ*. Radix–stipes joint retrolateral, almost all of stipes hidden by cymbium; embolus and TA arise dorsally (normally obscured by cymbium, Fig. 63); embolus a stout, sharply curved rod, tapering to a point after the curve (Fig. 61, 68); TA narrow at base, flanking the embolus, broadens to a lamina and free of embolus apically (Fig. 67); PM a pointed sclerotized bump (Fig. 61–62, 68). • *Colour in alcohol*. Carapace olive-grey with black median markings; dorsal eye tubercle yellow-orange. Chelicerae as carapace with fuscous markings. Labium, maxillae and sternum olive-grey. All femora pale basally to dark distally; distal legs mottled fuscous turning into distinct dark banding on distal metatarsi and tarsi; underside of patella–metatarsus III and IV with large black spots that merge together. Abdomen ventrally dark with white patches posterior to book lung covers; dorsally with dark pattern on a white ground. Palpal cymbium mottled black apically and down dorsal centre-line, rest olive-grey; apicodorsal points of tibia, patella and, to a lesser extent, femur mottled black, rest lighter mottling to creamy-white on femur.

Variation. As well as the variation in female abdominal shape shown (Figs 33–34, 38–41, also with taller humeral tubercles and as shown for *P. stygius*, Figs 42–43, 45), there is considerable variation in features such as relative leg lengths, length of eye tubercle, epigyne shape (Figs 47, 49–51) and development of macrosetae. One feature, which seems to be geographically linked, is the presence of dark, flattened macrosetae on some patellae and front tibiae. In the northwest (Northern Territory and Western Australia), all juvenile and male specimens show this feature (Figs 37, 60). In northeast Queensland specimens, however, these flattened macrosetae are sometimes small or absent on one or more legs, and they become progressively less frequent moving southwards. No individuals with strongly developed flattened macrosetae were found anywhere south of Edmonton (17°S). In Australia, the flattened macrosetae do not persist in adult females, but elsewhere some females have been recorded with genitalia consistent with *P. illepidus* but bearing varying numbers of large flattened macrosetae. Presence of similar macrosetae also appears to be variable in *P. stygius*.

The northern and more southerly eastern Australian populations show a consistent genetic differentiation in the examined fragment of the COI gene (see Fig. 248 and section "Separation of the Australian *Poltys* species using COI"). No consistent morphological differences could be found, but with only three females tested from each population and the inherent variability within *Poltys* species, there may not be enough data available to find patterns in the few known specimens. Except for spination, no differences were found in males from the two areas. This differentiation may represent two separate species but, at present, both the morphology and the lack of differentiation in the ITS2 gene suggest that this is not the case. If these populations are ever separated at the specific level, the types of both *P. keyserlingi* and *P. penicillatus* will require re-examination.

Only two males of *P. illepidus* from outside of Australia have been examined (from Penang in Malaysia and Lombok, Indonesia) but these both match the northern Australian males well.

Remarks. Intensive searching in 2000–2001 only recorded one species of *Poltys* on Lord Howe Island (*P. grayi* n.sp.). If *P. illepidus* currently occurs there, it is rare. It is also possible that the specimen Rainbow described (as *P. penicillatus*) was mislabelled. Lea, the collector, also visited Norfolk Island on the same collecting trip and there the species appears to be established.

Biology. Adult females spin a fine orb web 30–40 cm in diameter between trees or low herbage at night, in a space up to 4 m wide. A strong golden-coloured bridge thread is left in place during the day but the main web is usually taken down towards dawn (but see comments in Robinson *et al.*, 1974). The webs may be round, taller than wide or wider than tall, depending on the available supports. The webs of juvenile spiders are usually between dead twigs as in most other Australian *Poltys* species. Egg sacs are of fluffy yellow silk (Fig. 13). On two occasions they have been found laid in rolled up leaves at one end of the spanning web line, but several searches for egg sacs associated with females thought likely to have already laid eggs were unsuccessful, suggesting they may travel some distance to find a suitable place, or are good at hiding them. Smaller juvenile spiders and males usually mimic part of a dead twig during the day but large juveniles and females are more often on living or dead tree trunks or even down in low herbage. Individuals with spiky abdomens were found on the trunk of a tree and on a broken branch (Figs 1–2). Another was taken in a sweep net hiding in low herbage. Two rounded specimens were found like knobs or galls on a branch, another was in a dead flower head on a tree. One specimen from Lae, New Guinea, was reportedly found on potato and Robinson *et al.*, 1974 report *Poltys* specimens tentatively identified as *P. illepidus* hiding in curled leaves by day. Subadult females of the *P. illepidus*-group have been found in (unidentified) wasp-larders from nests in Bogor, Indonesia (RMNH) and were also recorded in several *Sceliphron laetum* F. Smith (Sphecidae) nest chambers from Madang, Papua New Guinea (Elgar & Jebb, 1999; vouchers in WAM).

Distribution. Northern Australia, New Guinea and SE Asia at least as far north as Thailand (Fig. 71). Also recorded from Norfolk and Lord Howe Islands to the east of Australia and probably also present on New Caledonia (juvenile of this species group seen in HNHM material). Records outside of this area such as Sri Lanka, India, the Philippines and Japan require examination of males for verification.

Poltys stygius Thorell

Figs 4, 42–45, 52–55, 64–66, 70, 72.

Poltys stygius Thorell, 1898: 344. Female holotype from Malewoon, Tenasserim, Burma, L. Fea; in MSNG, examined.

Poltys microtuberculatus Rainbow, 1916: 118, pl. 22, f.44. Juvenile holotype from Gordonvale, Queensland; in AM KS8693, examined. **New synonym**.

Remarks. Rainbow's type is a juvenile and cannot be said to be this species (rather than *P. illepidus*) with complete confidence. It has, however, the combination of physical features that are particularly common in this species and *P. stygius* is frequent today in this geographical area.

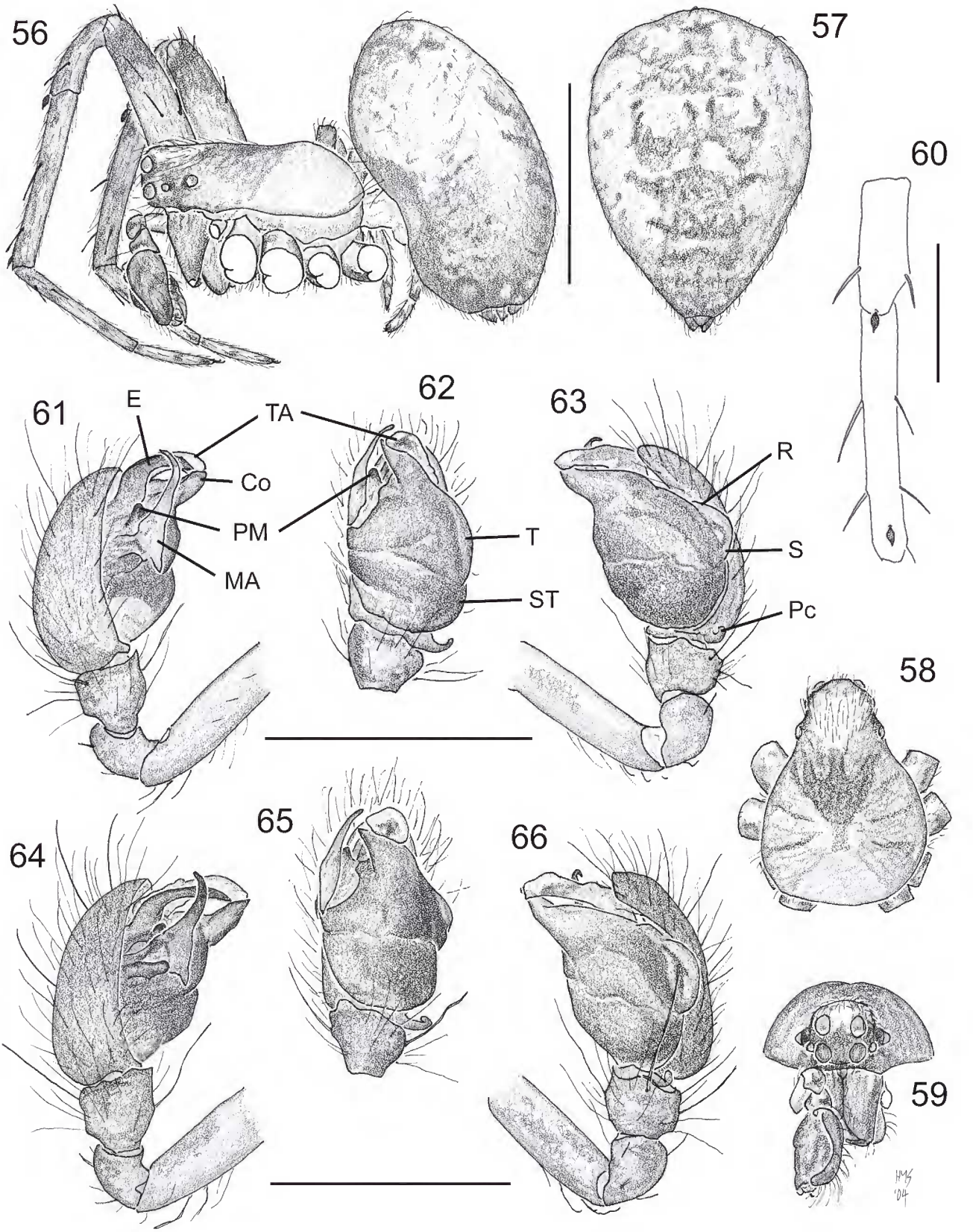
Material examined. AUSTRALIA: QUEENSLAND: ♂♂ KS86247–8, Cape Kimberley, track to lookout W of caravan park, 16°16'28"S 145°28'05"E, 21 Sep. 2003; ♀♀ KS33937, KS33934, KS33916, KS33842, KS86261, Edmonton, 17°01'S 145°44'E, 14 & 16 May 1972, Dec. 1969, 29 Aug. 1970, 18 Sep. 2003; ♂ KS58024, ♀ KS70357, Goldsborough Valley SF, side track to quarry, 17°12'43"S 145°44'56"E, 22 May 2000; ♀ S42529, Rokeby Stn, Cape York, 13°40'S 142°40'E, 31 May 1973; ♂ KS73155, Trinity Park, track to Earl Hill via Reed Rd, 16°47'59"S 145°42'33"E, 21 May 2000; ♂ KS75631, ♀ KS86260, ♂ KS86092, Trinity Park, 16°48'17"S 145°42'04"E, 7 Jan. 2002, 16 & 18 Sep. 2003; ♀ KS90969, Trinity Park, *Melaleuca* swamp, 16°48'12"S 145°42'04"E, 14 May 2000; ♀ (MMUS) Cairns, N Queensland. INDONESIA: SUMATRA: ♀ ex 21303 (MNHNP) Sumatra. MALAYSIA: PINANG: ♀ (BMNH), Penang, Glugor Estate, Banyan Lepas, 25 Jun. 1960. SABAH: ♂ (RMNH ex coll. CLD, 2000-704), Mt Kinabalu NP, Poring Hot Springs, 6°02'N 116°50'E, 22 Mar. 1996; ♂ (RMNH ex coll. CLD, 2000-704), Crocker Range, 5°26'N 116°08'E, 19 Feb. 2001. PAPUA NEW GUINEA: EAST SEPIK: ♀ KS8065, Kairiru Island near waterfall, 3°20'S 143°33'E, 12 Jun. 1976. MADANG: ♂♂ (RBIN) Baiteta forest, 5°01'S 145°45'E, 21 Apr. 1994 & 13 Jul. 1996. SINGAPORE: ♂ 20982 (JAM), Kranji, Singapore, 7 July 1992. COUNTRY NOT GIVEN: (RMNH) China Sea Islands, May 1894.

Reared specimens deposited in other institutions: ex ♀ KS86260: ♂ to QM S66573, ♂ to MSNG.

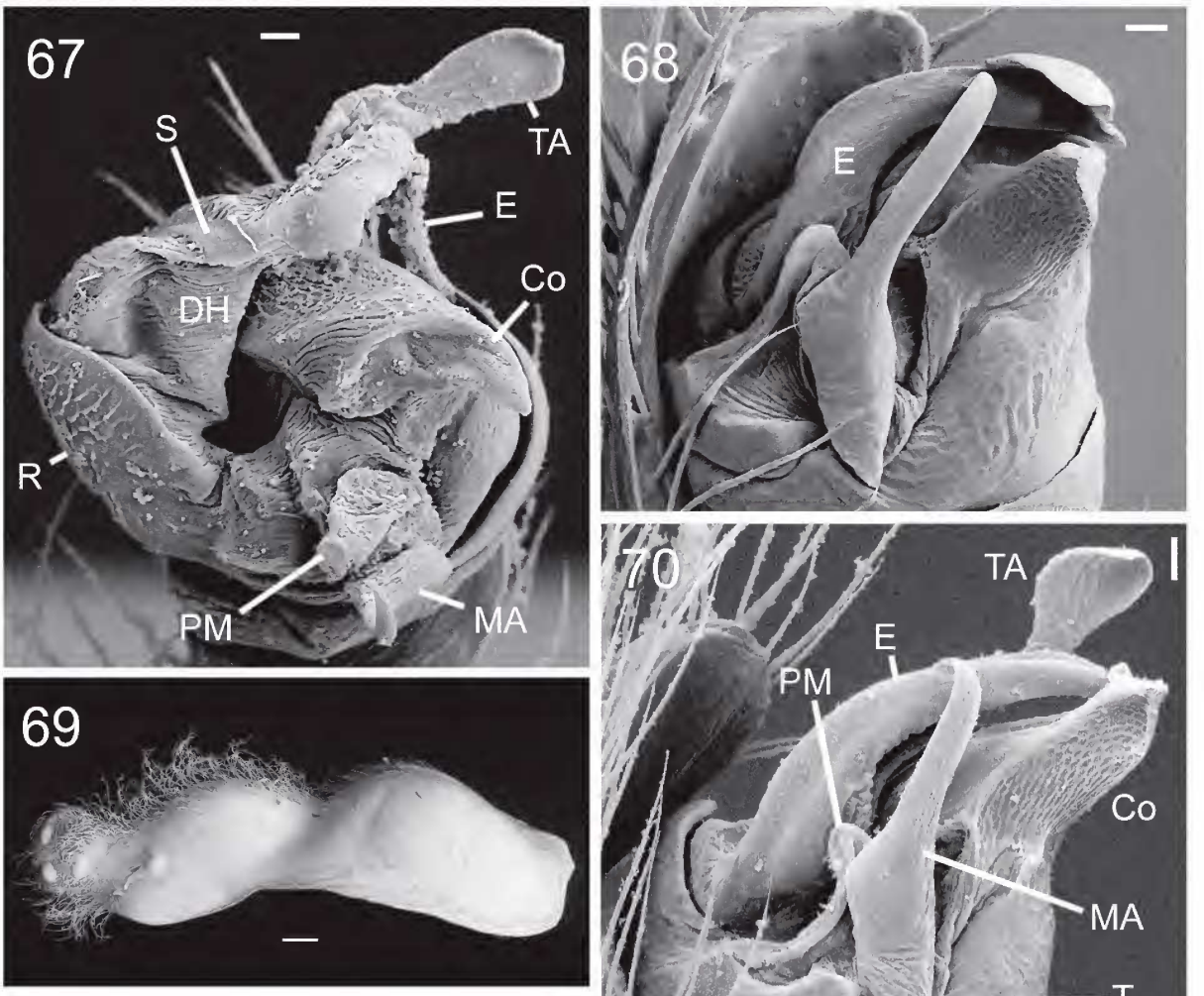
Diagnosis. **Female**. As *P. illepidus* (Figs 33–45) but with deep and wide foveae that are often distinctly paddle shaped (Figs 53, 55); posterior epigyne long, extending into the epigynal fold; posterior lobes of spermathecae usually visible entirely dorsal to the margin of the epigynal furrow in posterior view. **Male**. As *P. illepidus* (Figs 56–60), but with a longer, gently curving embolus and correspondingly longer conductor (Figs 64, 66, 70).

Description. **Female**. Carapace length range 6.25–7.50. *Drawn specimens* Figures: 42–43 KS86260; 44, 55, KS70357, 45, 52–54, MSNG (holotype). General characters see *P. illepidus*.

Female MSNG (holotype). *Prosoma*. Carapace: length 7.08, width 5.92, height 1.92; broad and low; eye tubercle distinct but short, broad basally both in dorsal and lateral views. Chelicerae: paturon with 4 promarginal teeth (Fig. 44). Labium: length 0.90, width 1.35. Sternum: length 2.86, width 2.98; deeply indented anteriorly for labium; sternal extensions at bases of legs II–IV. • *Eyes*. AME>PME≥ PLE>ALE; ALE c. 1× its own diameter from AME; ventral margin of ALE is ventral of mid point of AME. • *Legs*. P+TL I: 11.67, II: 10.42, III: 6.67, IV: 8.42; front femora slightly broadened; patellal and tibial macrosetae not flattened (but may be in juveniles and adults from some areas). • *Abdomen*. (Fig. 45). Length 14.83, width 12.08; broadest anterior to main apodemes; "microsigillae" well developed. • *Epigyne*. A broad fan-shaped plate, widest point about half-way in anterior view (Fig. 52); foveae broad, deep, paddle-shaped hollows, narrowing and partly overhung basally, separated by a long, strongly developed median ridge (Fig. 53, see also Fig. 55); posterior lobe of spermathecae visible dorsal to line of epigynal groove (Fig. 53); no copulatory ducts visible; spermathecae separated by half a spermatheca width or less; well sclerotized overall. • *Colour in alcohol*. Carapace dark reddish-chestnut,



Figs 56–66. *Poltys illepidus*-group males. 56–63, *P. illepidus*: 56, general lateral view; 57, abdomen, dorsal; 58, carapace and coxae, dorsal; 59, frontal carapace, right palpal organ and chelicerae; 60, left patella and tibia I, showing flattened macrosetae; 61–63, male palp, prolateral, ventral, retrolateral. 64–66, *P. stygius*, male palp, views as previous. Scale lines: 1 mm for Figs 56–59; 0.5 mm for Figs 60, 61–66.

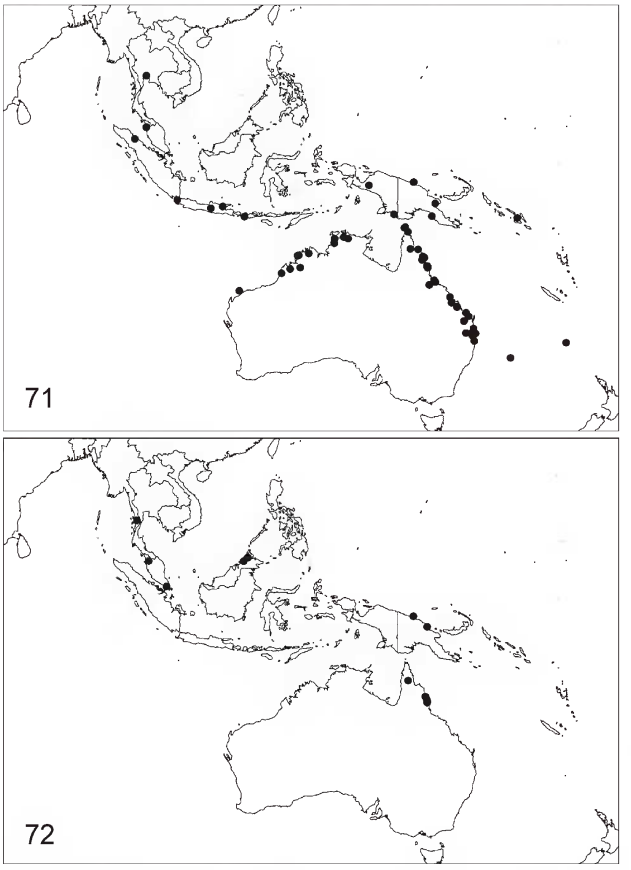


Figs 67–70. *Poltys illepidus*-group SEMs. 67–69, *P. illepidus*: 67, male palp expanded, apical view; 68, terminal bulbus, proventral; 69, female carapace, lateral, (from final moult) showing shape and setal pattern. 70, *P. stygius*, palpal bulbus, prolateral. Scale lines, palps = 20 µm; carapace = 300 µm.

slightly paler on dorsal caput and anterior eye tubercle. Chelicerae dark yellow basally, darkening distally to deep chestnut. Labium, maxillae and sternum orange-brown. Pedipalps yellow at femora darkening to black distally. Femora I, II and IV deep chestnut with a blue shine; femur III paler orange-brown; distal legs dark, mottled orange with copious brown–black. Abdomen ventrally fawn around pedicel, ringed by paler area then dorsal colouration, also pale around spinnerets; dorsally blackish background with paler patches and brown markings edged with yellow; remains of whitish patches on flanks.

Male. Carapace length range 0.98–1.41. *Drawn specimen* Figs 64–66, KS86092. General characters see *P. illepidus*.

Male KS86092. *Prosoma*. Carapace: length 1.33, width 0.96, height 0.47; eye tubercle poorly defined, broad and almost without any dip between caput and eye tubercle in lateral view. Labium: length 0.11, width 0.18. Sternum: length 0.53, width 0.51. • *Eyes*. AME>PME>PLE=ALE; ALE c. ⅓× its own diameter from AME; height of ventral margin of ALE is at mid point of AME. • *Legs*. P+TL I: 1.57, II: 1.49, III: 0.82, IV: 1.10; macrosetae of distal patella and tibia of legs I and II slightly flattened basally. • *Abdomen*. Length 1.75, width 1.20; a rather skewed ellipsoid, widest point near apex. • *Palpal organ*. (Figs 64–66, 70). Radix–stipes joint retrolateral, almost all of stipes hidden by cymbium, embolus and TA arise dorsally (normally obscured by cymbium, Fig. 66); embolus a stout, evenly curving rod, tapering slowly then abruptly (Figs 64, 70); TA narrow at base, flanking the embolus, broadens to a lamina and free of embolus apically (Fig. 70); PM a pointed sclerotized bump (Figs 64–65, 70). • *Colour in alcohol*. Carapace dark olive, most of caput dark brown–black; dorsal eye tubercle and part of caput orange. Chelicerae as carapace with light prolateral V near tip. Labium, maxillae and sternum dark olive. All femora orange basally darkening to dark olive-brown distally; distal legs orange with black markings, tarsi cream with black rings. Abdomen ventrally olive ringed by black; white flanks; dorsal with dark pattern on a white ground. Palpal cymbium black, edges brownish; tibia, and patella with black on cream, femur mainly creamy-white.



Figs 71–72. Distribution of *Poltys illepidus*-group. 71, *Poltys illepidus*; 72, *Poltys stygius*.

Remarks. On average *P. stygius* have longer legs than *P. illepidus*. Many *P. stygius* females have a more extensive pale patch on the caput than most *P. illepidus* and a shorter eye tubercle. Not all specimens, however, have either character and both are within the variation range of *P. illepidus*.

Variation. Few specimens are available for examination but there appears to be a similar range of variation to that seen in *P. illepidus*. Examined adult females from Australia and New Guinea have lacked flattened macrosetae on the patellae. Some Australian males and both the male from Singapore and the adult female from Sumatra have these flattened macrosetae but otherwise appear identical.

Biology. The webs of *P. stygius* appear to be similar to those of *P. illepidus*. A female collected at Trinity Park was hiding hung beneath a dead curled leaf on a living sapling during the day (Fig. 4). The species seems to prefer moist habitats, with a narrower habitat range than *P. illepidus*. Egg sacs have not been seen in the wild by the author but one laid in captivity was a white fluffy inner sac overlaid with rose pink silk. The unidentified egg sac shown in Clyne (1969: fig. 152) appears to belong to this species. This egg sac is pictured on the underside of a green leaf.

Distribution. Coastal far northeast Queensland through Sumatra and Borneo to Burma (Fig. 72).

The *Poltys columnaris* species group

The *Poltys columnaris*-group appears to be rather complex. The genitalia of the two Australian species are similar, especially in females, but the huge eye tubercle of *P. jujorum* n.sp. is distinctive, being far longer than in *P. milledgei*. These two species are also well separated genetically, at least in COI sequences. At least six species from the *P. columnaris*-group have been described from SE Asia and the Asian mainland. Three of these species, *P. columnaris* Thorell, *P. turriger* Simon and *P. squarrosus* Thorell, are similar in characters and may prove to be conspecific but the variation in eye position in these individuals almost bridges the gap between the two Australian species. Although existing names should be used if possible, both Australian species have been described as new because neither perfectly matches any of these types and it may be many years before suitable material is available to resolve this problem. A single male from Borneo, which may belong to one of these Asian species, is discussed below; this is definitely distinct from the Australian species. Another closely related SE Asian type is *P. pogonias* Thorell from the Nicobar Islands. This subadult female is also close to *P. milledgei*, except that there is no sign of the sclerotized eyespot-like maculae, which are visible on the abdomen of every other specimen examined (see below), and the eye arrangement is outside the variation seen in other specimens. Given the isolation of the Nicobar Islands, and several other apparent cases of speciation seen in island *Poltys* specimens examined during the course of this study, there is a good chance that this is an endemic species.

All *Poltys columnaris*-group species females have an extremely short and broad epigyne and most have rows of shiny black maculae on the dorsal abdomen, just anterior to the spinnerets (Figs 94, 124). These "eyespots" are smooth clear cuticular lenses that lie over black pigment spots. In living and well-preserved specimens, these can be extremely prominent and they may be used to deter predators as (at least from a human perspective down a microscope) they resemble rows of black, beady eyes. Some *P. columnaris*-group species also possess modified patellal spines, which as well as being flattened distally, are elongate and appear to have a weak fracture zone near the base of the shaft, at least in females (Fig. 123, arrowed). Females of both Australian species have these spines, as well as most males of *P. milledgei*. Most of the older types are missing many spines and have not been assessed for this character. The two Australasian *P. columnaris*-group species, and four out of the other six described species, have a rather elongate eye tubercle with an anterior protuberance between the anterior eyes (Figs 121, 223, 226, 229, 238). The remaining two species, *P. turritus* Thorell and *P. raphanus* Thorell (which will probably prove to be conspecific) have only a tiny bump between the PME (Figs 232, 235). In the Australian species, at least, female abdominal shape is rather less variable than in the other species groups dealt with here.

Matched males are known only for the two Australasian species. The *P. columnaris*-group male mentioned above from Borneo (RMNH ex coll. CLD) has eye tubercle proportions quite different to the Australian species. The palpal organs of this specimen show the same general features as seen in the two Australian species, with a proportionately long MA, a broad, dorsal TA, and a reduced, prolaterally displaced, conductor. The palpal characters are intermediate between the two Australian species, but somatic features are distinctive.

Poltys jujorum n.sp.

Figs 73–79, 84–88, 95–99, 104–109, 116–118, 121–124.

Etymology. Named in honour of Judy Thompson and John Olive, whose generous hospitality has greatly facilitated several trips to northern Queensland.

Type material. AUSTRALIA: QUEENSLAND: HOLOTYPE ♀ S66574 (ex KS58080), Goldsborough Valley SF, side track to quarry, 17°12'S 145°44'E, 22 May 2000, M&S, webs on dead twigs at night, open woodland. PARATYPES ♂ KS58074, ♀ KS58078, data as holotype; ♂ KS58064, lane W of Capt. Cook H'way, c. 2.5 km W of Trinity Beach, 16°47'S 145°40'E, 14 May 2000, M&S, beating; ♀ KS84328, ♂ S66575, Abergowrie SF, Broadwater Creek camping area, 18°25'S 145°56'E, 24 May 2000, M&S (♀ night coll., ♂ beating); ♀ S42574, Scraggy Point, Hinchinbrook Is., 18°17'S 146°06'E, 5 Jan. 1986, P. Myroniul?[sic], dune and swale system.

Other material. AUSTRALIA: QUEENSLAND: ♀♀ KS58066 (2), KS58067–9, ♂♂ KS58070–1, Abergowrie SF, 18°25'S 145°56'E, 24 May 2000; ♀♀ KS58065, 2.5 km W of Trinity Beach, 16°47'S 145°40'E, 14 May 2000; ♀♀ KS33931, KS33941, Edmonton, 17°01'S 145°45'E, 29 May 1973, 1 Apr. 1973; ♂ KS58073, ♀♀ KS58075–77, KS58079, KS58080 (3), Goldsborough Valley SF, 17°12'S 145°44'E, 22 May 2000; ♀ KS33849, Kuranda, 16°49'S 145°38'E, 15 Aug. 1971; ♀ KS33940, Mareeba, 17°00'S 145°26'E, 8 Sep. 1974; ♀ KS58063, Tam O'Shanter SF, 0.9 km W Limbo Ck, Tully–Mission Beach Rd, 17°55'S 146°04'E, 23 May 2000; ♂ S42559, Black Mountain, NEQ, summer 1971–2; ♀ S42619, Iron Range, 12°39'S 143°17'E, 30 Jun. 1976; subadult ♀ S42504, Lockerbie Scrub, 10°48'S 142°28'E, 18 Apr. 1973; ♀ S42579, Shiptons Flat, 15°48'S 145°15'E, 22 Apr. 1982.

Remarks. There are no definite records for this species outside Australia. A subadult female from Kinabalu NP, N. Borneo (RMNH ex coll. CLD) that is comparable in eye tubercle proportions and general appearance, might indicate a wider distribution.

Diagnosis. **Females**. From other species groups: carapace profile relatively high and narrow (Fig. 76), extended and pointed eye tubercle (Fig. 84), front femora relatively short and distinctly broadened (Fig. 73), epigyne much wider than long (Fig. 104). From *P. milledgei*: eye tubercle larger and more elongate and ALE well separated from AME (Fig. 85); copulatory ducts are short so spermathecae are directly basal to the foveae in posterior view (Fig. 105). **Males**. From other species groups by extended and pointed eye tubercle (Fig. 98), short embolus and reduced conductor (Fig. 107–108). From *P. milledgei*: eye tubercle massive (Fig. 98), flattened leg macrosetae are usually short and rounded (Fig. 99), the conductor wraps further prolaterally and is adpressed to the embolus so that it may be difficult to distinguish in ventral view. In lateral view, an open space is usually present between the MA and the other sclerites (compare Figs 107 and 113, 118 and 120).

Description. **Female**. Carapace length range 2.94–3.67. *Drawn specimens* Figures: 73–77, 84–85, KS58077 (male from Fig. 95); 78–79, KS58067; 86–87, 106, S66574 (holotype); 88, KS58080; 104–105, KS58078.

Holotype. *Prosoma*. Carapace: length 4.00, width 2.69, height 1.10; long and narrow (Figs 73, 76); eye tubercle well developed, strongly elevated (Fig. 85); produced into a rounded protuberance between PME; eye tubercle sagittate in dorsal view due to tufts of flattened setae that arise on the tip of the eye tubercle and posterior to the PME (Figs 121–122). Chelicerae: paturon with 4 promarginal teeth (Fig. 77). Labium: length 0.39, width 0.65. Sternum (Fig. 75): length 1.37, width 1.43; sternal extensions at bases of legs III–IV. • *Eyes*. (Figs 76, 85). AME=PME>PLE>ALE; ALE > 2× its own diameter from AME, almost half way towards PLE position; ventral margin of ALE is more ventral than AME; both pairs of anterior eyes are set looking ventrally on eye tubercle (Fig. 85). • *Legs*. P+TL I: 4.78, II: 4.33, III: 2.90, IV: 3.47; front femora distinctly broadened with greatest diameter c. ⅗ way to apex (Fig. 73); some patellal and tibial macrosetae on all legs flattened, distal patellal macrosetae usually elongate (Fig. 88), but often broken at weak point (Fig. 123, arrowed). • *Abdomen*. Length 10.83, width 2.75; broadest just anterior to main apodemes; on dorsal surface just anterior to spinnerets there are two rows of shiny, black maculae, 6 on a posteriorly pointing fold, 4 immediately anterior, and two anterior lateral pairs (Figs 86–87). • *Epigyne*. Much broader than long, most of the anterior surface is covered by a broad "lip" (Figs 104, 106); posterior plates short; median posterior plate not reduced but fused or closely adjacent to lateral plates over much of their lengths, then narrows to a bridge between pocket-like distal foveae (Fig. 105); copulatory ducts exit foveae laterally, ducts usually shorter than *P. milledgei*; spermathecae separated by about a spermatheca width. • *Colour in alcohol*. Carapace yellow, caput fuscous brown with darker patches anterior to PLE, stripes of pale yellow lead onto orange-brown eye tubercle; dark brown ventral to main eyes. Chelicerae brown, paler V distally. Labium, maxillae and sternum yellow-brown. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I and II with a small amount of black basally, then all yellow except for a broad black terminal band; femur III pale yellow, mottled with black, to black distally; femur IV mostly dark; all dark areas with blue shine; distal legs mottled with yellow and brown. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers; white flanks then laterally and anteriorly to dorsal colour pattern of black and brown over some white.

Male. Carapace length range 1.04–1.12. *Drawn specimen* Figs 95–99, 107–109, KS58074.

Male KS58074. *Prosoma*. Carapace: length 1.14, width 0.71, height 0.33 (at fovea); lightbulb-shape in dorsal view (Fig. 98); highest at eye tubercle, latter massive and elevated (Fig. 95); eye tubercle anterior a blunt point; in dorsal view eye tubercle sagittate as in female. Clypeus >1× AME. Labium: length 0.09, width 0.19. Sternum: length 0.42, width 0.42. • *Eyes*. (Figs 95, 97) AME≥PME>PLE≥ALE; ALE >1× its own diameter from AME; ventral margin of ALE is ventral to that of AME. • *Legs*. (Fig. 95). P+TL I: 1.04, II: 0.98, III: 0.57, IV: 0.73; all patellae and some tibiae with some macrosetae flattened into a leaf-shape (Fig. 99). • *Abdomen*. (Figs 95–96). Length 1.57, width 0.88; a tall, rather lumpy ellipsoid, with slightly extended rounded apex, widest at mid-height; small tufts of setae arise from bumps; apodemes visible. • *Palp*. (Figs 107–109, 117–118). Tegulum rather angular (Fig. 108); conductor wispy and adpressed to proventral embolus (Figs 107, 117–118); MA filiform, broad basally (Figs 107, 118); small PM possibly present (see *P. milledgei*, Fig. 27) but if so, normally hidden by MA; radix–stipes joint dorsal, totally hidden by cymbium (Fig. 109); TA a broad membranous flap (Figs 108, 117–118); embolus short and stout (Figs 108, 118). • *Colour in alcohol*. Lateral carapace light olive, caput darkens slightly to eye tubercle, latter orange dorsally, carapace and caput

with black median markings; dark brown on ventral eye tubercle, around AME and ALE and under PLE (Fig. 97). Chelicerae, labium, maxillae and sternum fuscous olive; chelicerae, with yellow distally. Femora I and II pale creamy-olive darkening distally; femur III olive-white basally, with spots and terminal band; femur IV olive with white patch retrolaterally; distal legs I and II with dark olive rings and marks to mid metatarsus, then white with black marks; legs III and IV olive-white dorsally and black maculation ventrally. Palpal cymbium dark brown, contrasts with white tibia, patella and femur, tibia and patella with black tips. Abdominal book lung covers and epigastric area pale, otherwise ventrally dark grey; dorsum mostly grey–white with black speckling and a pair of black scroll-like lines.

Variation. In some females the eye tubercle is higher than the main carapace. Female abdominal shape is less variable than in other species groups, all are elongate to a greater or lesser extent and none has been seen with humeral tubercles (Figs 73–74, 78–79, also as in *P. milledgei*, 80–83 and 91–92). Abdominal "eye spots" are rather variable in size and number. Epigynes are rather variable and often difficult to distinguish from *P. milledgei*.

Biology. The spiders make a typical fine web at night on dead twigs; tropical woodland appears to be the main habitat of the species. The egg sac is a fluffy white sac overlaid with cream and strands of brown or grey, laid on the underside of a dead twig (similar to that of *P. milledgei*, Fig. 14). Chloropid flies emerged from the field-collected egg sac from Goldsborough Valley SF.

Distribution. Coastal far northeast Queensland and possibly further northwards (Fig. 116).

Poltys milledgei n.sp.

Figs 14, 19–21, 27–28, 80–83, 89–94, 100–103, 110–115, 116, 119–120.

Etymology. This species is named in honour of Graham Milledge who has assisted me on many collecting trips.

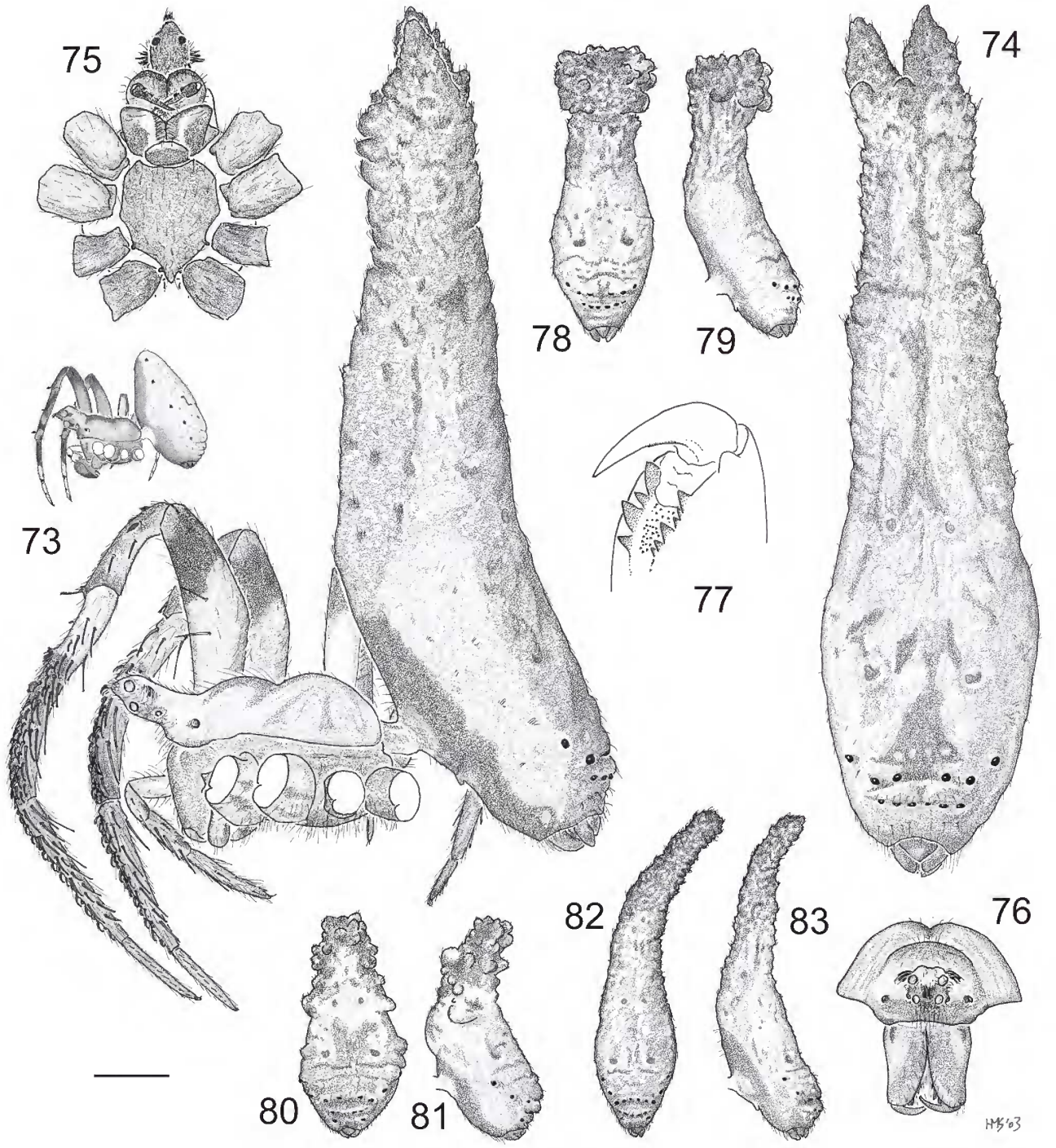
Type material. AUSTRALIA: NORTHERN TERRITORY: HOLOTYPE ♀ KS84110, Humpty Doo, Solar Village, 12°35'S 131°05'E, 20 May 1999, G,M&S & J. Webber, night collecting. PARATYPES ♂ KS55728, Litchfield NP, Florence Falls, 13°09'S 130°46'E, 19 May 1999, G,M&S; ♂ WAM T62875 (ex KS55740) 23 May 1999, on silk line between dead twigs at night; ♂ NTM A952, as KS55740, 19 May 1999, G,M&S, hanging in dead tree near subadult ♀ at night; ♀ KS55738, Litchfield NP, Wangi Falls, 13°09'S 130°40'E, 22 May 1999, G,M&S; ♀ NTM A953, Duncans Douglas, nr Daly River Research Station, 13°50'S 131°11'E, 18 May 1991, J. Webber; ♀ WA98/1981, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992, M.S. Harvey, J.M. Waldock.

Other material examined. AUSTRALIA: NORTHERN TERRITORY: ♂ KS55735, Darwin, East Point, 12°25'S 130°49'E, 21 May 1999; ♀♀ KS55726 (3), Humpty Doo, Solar Village, 12°35'S 131°05'E, 20 May 1999; ♂ KS53838, ♀ KS53839, ♂♀ KS53840, ♀ KS53841, Litchfield NP, Florence Falls, 13°09'S 130°46'E, 5–6 Aug. 1998; ♀♀ KS55730–31, ♀♀ KS55739 (3), ♂ KS55740, ♂♀ KS55741, ♂ KS55743, Litchfield NP as previous record, May 1999; ♂ KS59254 ex eggsac laid by one of KS55739, matured 14 Sep. 1999; ♀♀ (3) KS55736, Litchfield NP, Wangi Falls, 13°09'S 130°40'E, 22 May 1999; ♀ (NTM), Melville Island, 11°33'S 130°56'E, 3 Aug. 1975; ♀ (NTM), Wangi Station, 13°09'S 130°38'E, 22 Aug. 1975; ♂ S42555, South Alligator Inn, 12°40'S 132°30'E, Nov. 1979; ♂♀ S42556, West Alligator River mouth, 12°15'S 132°16'E, 12 Nov. 1979; ♀♀ S42581, West Alligator mouth, 12°11'S 132°16'E, 22 July 1979; ♀♀ WA98/1982–3, Cahills Crossing, 12°25'S 132°58'E, 29 May 1992. QUEENSLAND: subadult ♀ S42587, Rokeby Station, 13°40'S 142°40'E, 30 May 1973 (eye tubercle proportions appear to match this species). WESTERN AUSTRALIA: ♀ KS55747, Lake Argyle Rd, 9 km N of campsite, 16°02'S 128°46'E, 9 June 1999; ♀ WA98/1972, Walcott Inlet (South), 18°27'S 124°45'E, May 1996. INDONESIA: BALI: ♀ & juveniles (RMNH ex coll. CLD), Ambengan, N. Bali, 21 Jan. 1990. SUMBAWA: ♀♀ & juveniles (RMNH ex coll. CLD), Samokat, 20 hrs from Besar, 3 Jan. 1990.

Diagnosis. As *P. jujorum* but with a more delicate and less elongate eye tubercle (Figs 90, 100). **Females**. Epigynal copulatory ducts are relatively long so the spermathecae are separate from the foveae in posterior view (Fig. 111). **Males**. The flattened macrosetae of patellae I and II are usually elongate (ovate in males of *P. jujorum*) (Fig. 103); the free part of the membranous palpal conductor is visible separate from the embolus in lateral view, partially filling the space between the MA and the other sclerites (compare Figs 113 and 107, 120 and 118).

Description. **Female**. Carapace length range 2.69–3.80. *Drawn specimens* Figures: 28, S42581; 80–81, KS55736; 82–83, KS53841; 89–90, 94, KS55747; 91–92, 110–111, KS84110 (holotype); 93, WAM 98/1982; 112, KS55726. General features as *P. jujorum*, except for eye tubercle.

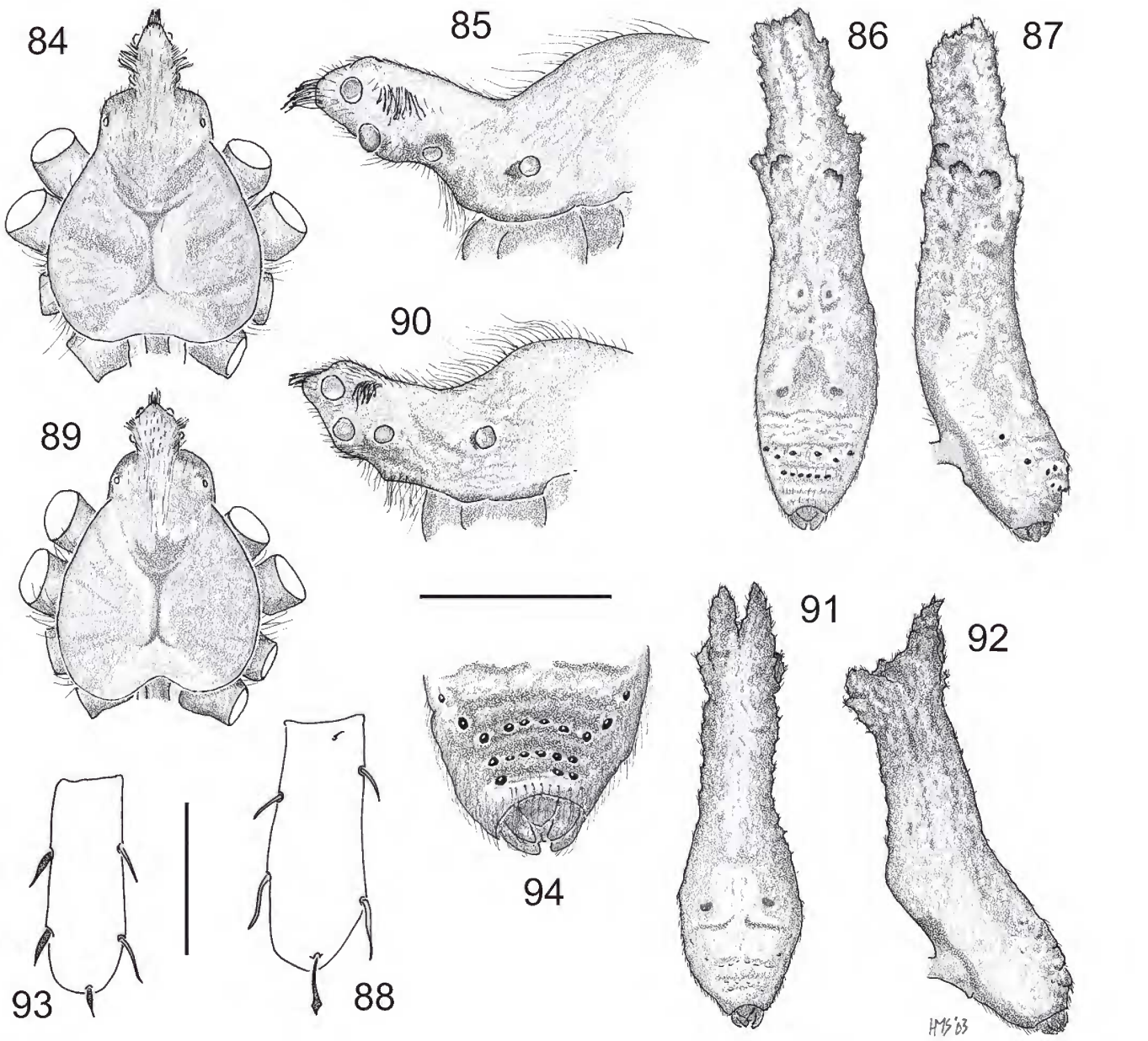
Holotype. *Prosoma*. Carapace: length 3.22, width 2.29, height 0.97; long and narrow; eye tubercle well developed, distinctly elevated (Figs 89–90); produced into a rounded protuberance between the PME; eye tubercle sagittate in dorsal view due to tufts of flattened setae that arise on the tip of the eye tubercle and laterally posterior to the PME (as in *P. jujorum*, Figs 121–122). Chelicerae: fang medium length; paturon with 4 promarginal teeth. Labium: length 0.37, width 0.57. Sternum: length 1.37, width 1.31; sternal extensions at bases of legs III–IV. • *Eyes*. (Fig. 90) AME>PME>PLE>ALE; ALE c. 1× its own diameter from AME; height of ventral margin of ALE is level with ventral margin of AME. • *Legs*. P+TL I: 4.37, II: 4.08, III: 2.65, IV: 3.31; front femora distinctly broadened with greatest diameter c. ⅗ way to apex; some patellar and tibial macrosetae on all legs flattened distally (Fig. 93), macrosetae on distal patellae usually short. (In *P. jujorum* these are usually long in females, although often broken. This is the opposite to the relative states in males.) • *Abdomen*. (Fig. 91–92). Length 10.01, width 3.28; broadest just anterior to main apodemes; on dorsal surface just anterior to spinnerets there are two rows of 6 shiny, black maculae on posterior pointing folds, plus a partial row of two posterior to these and two additional lateral pairs anteriorly. (Not well preserved on holotype, typical arrangement better illustrated by Fig. 94). • *Epigyne*. Much broader than long, most of the anterior surface is covered by a broad "lip" (Fig. 110); posterior plates short but usually longer than in *P. jujorum*; median posterior plate not reduced, appears almost fused to lateral plates over much of their lengths, then narrows to a bridge between pocket-like distal foveae (Figs 111–112); copulatory ducts and spermathecae often visible through cuticle, former can be



Figs 73–83. *Poltys columnaris*-group, female characters. 73–77, *P. jujorum*: 73, general lateral view with male at same scale; 74, abdomen, dorsal; 75, ventral prosoma and coxae; 76, frontal carapace and chelicerae; 77, left chelicera showing denticles. 78–83, examples of variation in abdominal shape seen in both Australian species, dorsal and ventral (78–79, *P. jujorum*, 80–83, *P. milledgei*). Scale line: 2 mm for Figs 78–83; 1 mm for Figs 73–76; 0.25 mm for Fig. 77.

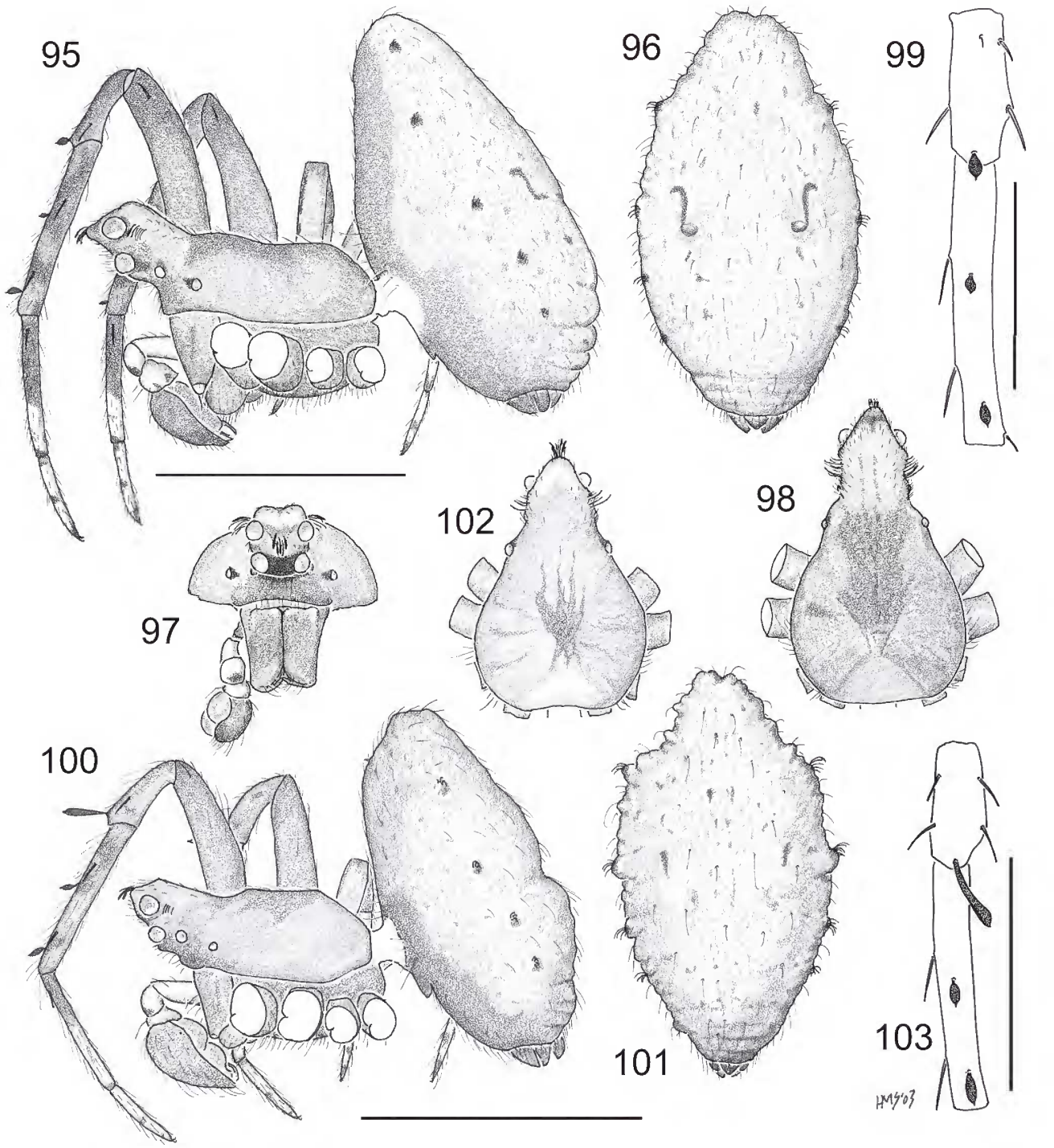
seen to be longer than in *P. jujorum*; spermathecae separated by about a spermatheca width. • *Colour in alcohol*. Carapace yellow, caput and eye tubercle orange-brown, with yet darker patches anterior to PLE and on posterior caput; black around secondary eyes, dark brown ventral to main eyes. Chelicerae brown, yellow V distally. Labium, maxillae and sternum mid brown. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I to III with a small amount of black basally, then all yellow except for a broad black terminal band; femur IV mostly dark brown; distal legs mottled with yellow and brown. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers; laterally and anteriorly then to dorsal colour pattern of black and brown over fawn and white; darkest at anterior.

Male. Carapace length range 0.78–0.96. *Drawn specimens* Figures: 27, KS55740; 100–102, 113–115, KS55741; 103, KS59254.



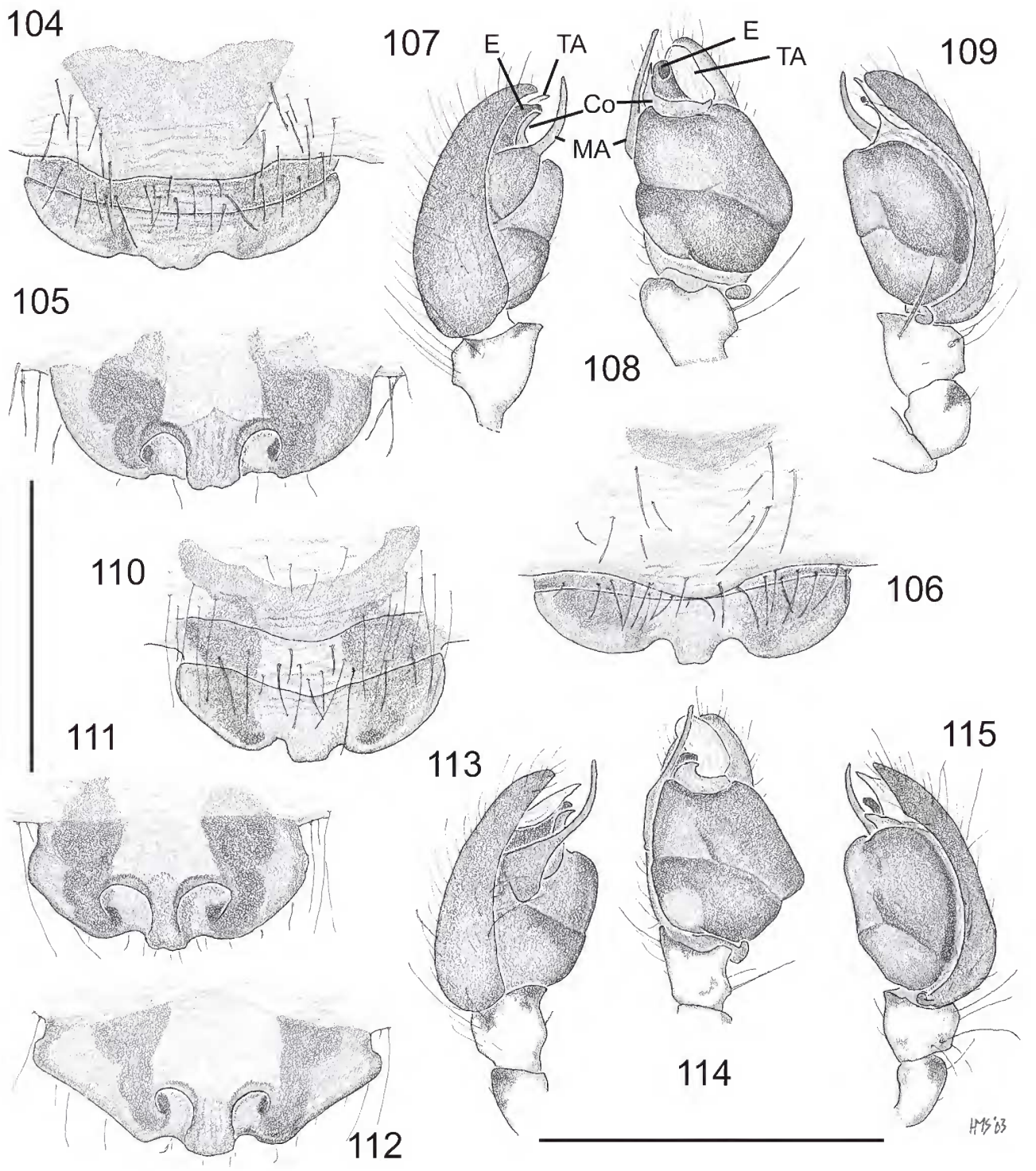
Figs 84–94. Australian *Poltys columnaris*-group females. 84–88, *P. jujorum*: 84, carapace and coxae, dorsal; 85, eye region, lateral; 86–87, holotype abdomen, dorsal and lateral; 88, spination, leg I dorsal patella. 89–94, *P. milledgei*: subjects as 84–88, 94, abdominal maculae, posterodorsal. Horizontal scale: 3 mm for abdomens; 2 mm for Figs 84, 89, 94; 1 mm for Figs 85, 90. Vertical scale = 1 mm for patellae.

Male KS55728. *Prosoma*. Carapace: length 0.86, width 0.55, height 0.31; lightbulb-shape in dorsal view (Fig. 102); highest at eye tubercle; eye tubercle elongate with distinct "v" between caput and posterior eye tubercle in lateral view (Fig. 100); eye tubercle anteriorly a broadly rounded point; eye tubercle sagittate in dorsal view as in female. Labium: length 0.08, width 0.15. Sternum: length 0.35, width 0.34. • *Eyes*. (Fig. 100). PME=AME>PLE≥ALE; ALE c. ⅛× its own diameter from AME; ventral margin of ALE is just dorsal to that of AME. • *Legs*. (Fig. 100). P+TL I: 0.84, II: 0.76, III: 0.47, IV: 0.61; distal patellar setae of legs I and II flattened and elongate (Fig. 103), distal patellar setae legs III and IV and some dorsal tibial macrosetae on all legs flattened to an elongate leaf-shape. • *Abdomen*. (Figs 100–101). Length 1.24, width 0.73; a tall, rather lumpy, ellipsoid, with slightly extended rounded apex, widest at mid-height; tufts of setae arise from bumps. • *Palpal organ*. (Figs 113–115, 119–120). Tegulum rather angular (Fig. 114); conductor a small membranous crescent, basal part difficult to discern clearly under a light microscope (Figs 114, 119); MA longer and more slender than in other species (Figs 113, 120); PM hidden (if present, see Fig. 27); radix–stipes joint dorsal, totally hidden by cymbium (Fig. 115); TA a broad membranous flap (Figs 114, 119–120); embolus short and stout (Fig. 120). • *Colour in alcohol*. Lateral carapace light yellowish-olive, caput darkens slightly to eye tubercle,



Figs 95–103. Australian *Poltys columnaris*-group males. 95–99, *P. jujorum*: 95, general lateral view; 96, abdomen, dorsal; 97, frontal carapace, right palpal organ and chelicerae; 98, carapace and coxae, dorsal; 99, left patella and tibia I showing flattened macrosetae. 100–103, *P. milledgei*: 100, general lateral view; 101, abdomen, dorsal; 102, carapace and coxae, dorsal; 103, left patella and tibia I showing flattened macrosetae. Horizontal scales: 1 mm for Figs 95–98, 100–102; vertical scales 0.5 mm for legs.

latter orange over the PME, carapace with black median markings; dark brown round AME, extends round ALE and under PLE. Labium and maxillae fuscous. Chelicerae yellow with fuscous centre. Sternum yellow-brown with black edges. Femora pale creamy-olive with fuscous markings; distal legs I and II with brown rings and marks to mid metatarsus, then white with black marks; legs III and IV olive-white dorsally and almost solid black maculation proventrally. Palpal cymbium dark brown, contrasting with white tibia, patella and femur; tibia and patella with black tips. Abdominal book lung covers pale, white towards spinnerets; surrounding ventral areas grey; dorsum mostly grey–white with black speckling, black on the bumps and black "cello" marks.



Figs 104–115. Australian *Poltys columnaris*-group genitalia. 104–109, *P. jujorum*: 104–106, epigynes, 104, 106, anterior, 105, posterior (106, holotype); 107–109, male palp: prolateral, ventral, retrolateral. 110–115, *P. milledgei*: 110–112, epigynes, 110, anterior, 111–112, posterior (110–111, holotype); 113–115, male palp: prolateral, ventral, retrolateral. Scale lines = 0.5 mm: vertical line for epigynes, horizontal for palps.

Variation. As in *P. jujorum*, the female abdominal "eye spots" are rather variable in size and number. Female abdominal shapes and epigynes also feature a similar range of variation. One male from Darwin (KS55735) has all the flattened macrosetae short and rounded (like *P. jujorum* males).

Biology. The spiders make a typical fine web made at night on dead twigs and vines; only recorded from monsoon rainforest and woodland. The egg sac is like that of *P. jujorum*, a small white "sac" with overlay of cream, and sometimes grey or brown silk (Fig. 14), laid on the underside of a dead twig.

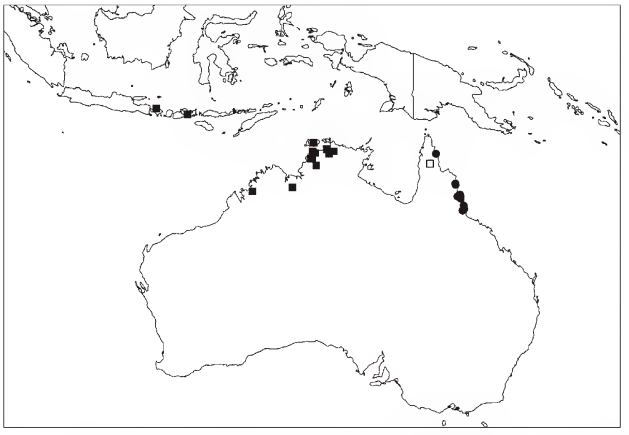


Fig. 116. Distribution of Australian *Poltys columnaris*-group species: *Poltys jujorum* (●); *Poltys milledgei* (adult records, ■; subadult, □).

Distribution. The far north of Western Australia, the Northern Territory, southern Indonesia and possibly Queensland (Fig. 116).

The *P. frenchi* species group

Morphologically, these species appear to be the link between the *P. illepidus*-group and the *P. laciniosus*-group. There are usually four prolateral cheliceral teeth (LsLs) in *P. frenchi*, but this is often reduced to three (LLs) in *P. timmeh* n.sp. Specimens of *P. frenchi* are variable in build. Heavier bodied females look rather like *P. illepidus*-group animals, especially when the abdomen is swollen with eggs, but lightly built specimens are much more slender, more like the *P. laciniosus*-group. There is also a similar range of variation in abdominal shapes as in the *P. laciniosus*-group. Males are extremely lightly built, even more so than *P. laciniosus*-group species. The genitalia also show some intermediate characters: like the *P. illepidus*-group, the male palp has a distinct TA, but the embolus arises retrobasally, as in *P. laciniosus*-group species (Fig. 29); the PM is also well developed, although quite different in form to either group (Fig. 125). In females, the spade-shaped epigyne is intermediate in shape and there appears to be a distinct, although short and narrow, copulatory duct that is formed similarly to that in the *P. laciniosus*-group (Fig. 30). No modification of patellal macrosetae has been noted.

Only two species are currently recognized, *P. frenchi*, which occurs from Australia to the southern Indonesian islands and *P. timmeh*, from New Caledonia and nearby islands. A single examined female from the highlands of West Papua (RMNH), if not teratogenic, may also be in the *P. frenchi*-group but its rather unique epigyne is difficult to place at present.

Poltys frenchi Hogg

Figs 9, 12, 29–30, 125–135, 138–143, 148–154, 158.

Poltys frenchi Hogg, 1899: 143, pl.13, f.2. Female holotype, Upper Endeavour River, Queensland, Australia; in NMV (K953), examined.

Poltys sigillatus Chrysanthus, 1961:211, fig. 74–77. Female holotype, Mindiptana area, (locality marked "Y" on map in Chrysanthus, 1971), 1959, Br. Monulfus, in RMNH (#970); examined. **New synonym**.

Remarks. Doleschall's *P. moluccum* and Bradley's *P. papuensis* may be senior synonyms of this species. The types, however, have not been located, and neither are definitively identifiable from the original descriptions. The specimen that Thorell (1878) probably used in his redescription of *P. moluccum* has been examined (NHRM, 1026). It is a juvenile from the *P. illepidus*-group and is not referable to the present species.

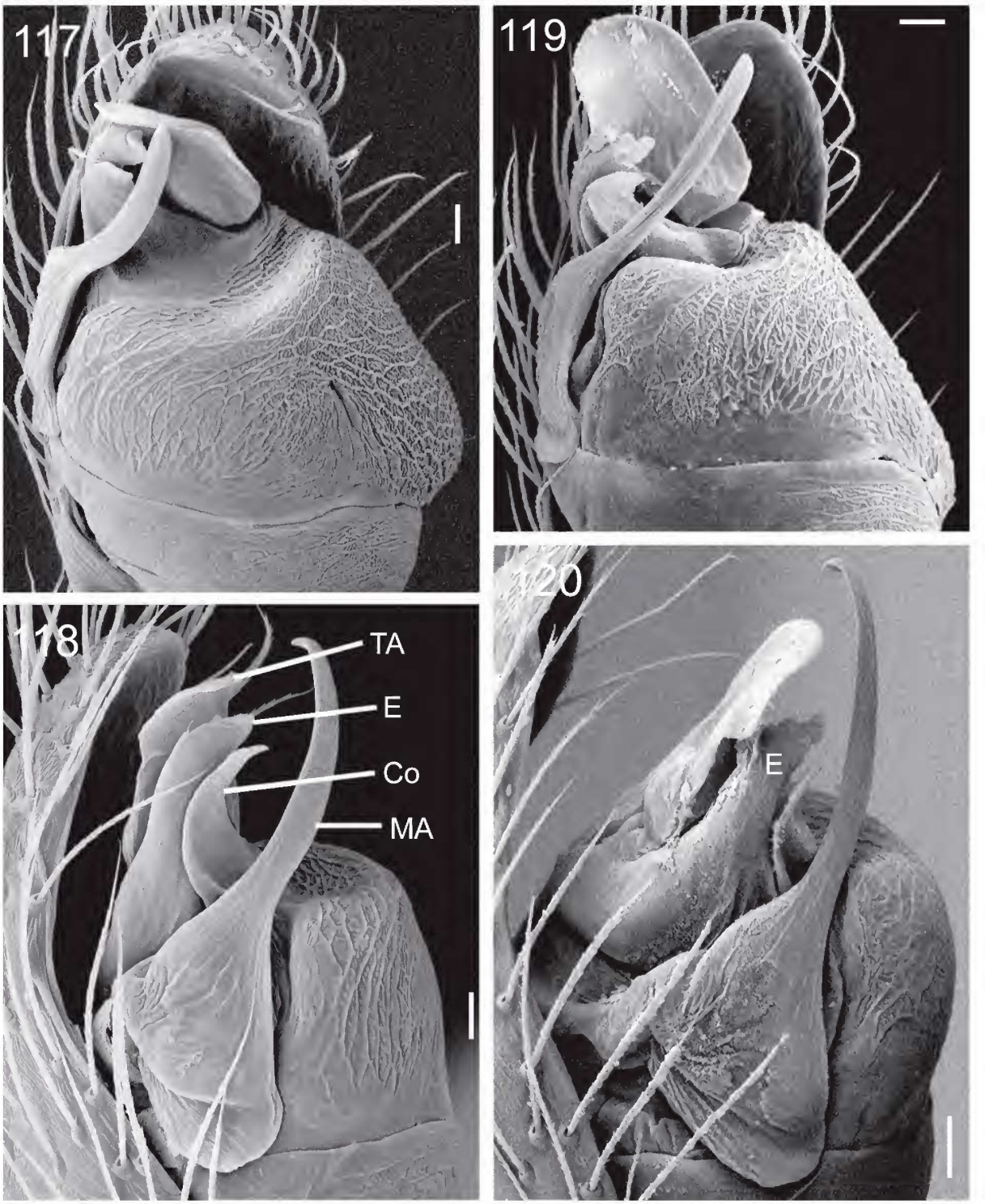
Material examined. AUSTRALIA: QUEENSLAND: ♂♂ KS86341, KS86342–44, ♀♀ KS86345–46, Cape Kimberley, track to lookout W of campsite, 16°16'28"S 145°28'05"E, 21 Sep. 2003; ♀♀ KS33928, KS33938, KS33958, KS33968–69, Edmonton, 17°01'S 145°44'E, 20 Sep. 1976, 8 Jun. 1975, 28 Aug. 1970, 2 Sep. 1976, 28 Aug. 1976; ♂♂ KS86338–40, ♂♀ KS86350–51, ♂ KS86491, Edmonton, as previous record, 18 Sep. 2003; ♂♂ KS58026–7, KS70356, Trinity Park, S side of Moores Gully, 16°48'12"S 145°42'04"E, 14 May 2000; ♂ KS86353, as previous record, 18 Sept. 2003; ♂♂ KS86254, KS86352, KS86492, Trinity Park, S end of Panguna Rd, 16°48'46"S 145°41'20"E, 24 Sep. 2003; ♀ KS86490, Wonga Beach, near caravan park, 16°19'58"S 145°25'19"E, 20 Sep. 2003; ♀ S42562, Cooktown, 15°28'S 145°15'E, Dec. 1975; ♀ S42620, Jacky Jacky Ck, Cape York, c. 12°36'S 143°12'E, 28 Aug. 1985; ♀ S42503, Lockerbie, 10°48'S 142°28'E, 30 Jan. 1975. INDONESIA: MOLUCCAS [MALUKU]: ♀ (RMNH) Aru Is, Manoembai, 11–14 Oct 1929, Snellius expedition. PAPUA NEW GUINEA: MADANG: ♂♂ (RBIN) Baiteta forest, 5°01'S 145°45'E, 4 Jun. 1993 & 15 Jun. 1995. SANDAUN: ♀ (HNHM) Feramin, NE (sic) Telefomin, 1450 m, 26–27 Aug. 1963. SIMBU: ♀ (HNHM) Karimui, 9–16 Jul. 1963.

Reared specimens deposited in other institutions: ex female KS86346: ♂ to QM S66576, ♂ to NMV K8897.

Diagnosis. **Females**. From other species groups: epigyne an inverted spade-shape, as long or longer than wide, but widest away from the base (Figs 138–140); carapace profile low and broad, pale in colour, with a well defined eye tubercle (Figs 127, 130); front femora with distinct broadening (Fig. 127); four prolateral cheliceral teeth. From *P. timmeh* (non Australian) by narrower, less marginal epigynal foveae (Figs 139–140). **Males**. From other species groups by well defined, but almost flat-fronted, eye tubercle (Fig. 148) (recently collected specimens with bright orange–yellow on creamy-white carapace dorsally, Fig. 150); legs without flattened macrosetae; male palp embolus arises prolaterally (like *P. laciniosus*-group) but has distinct TA (Fig. 154). From *P. timmeh* by straight, solid conductor (Figs 152– 154) and that most of the sclerites are smaller in proportion to the tegulum and subtegulum (compare ventral views, Figs 153 and 156).

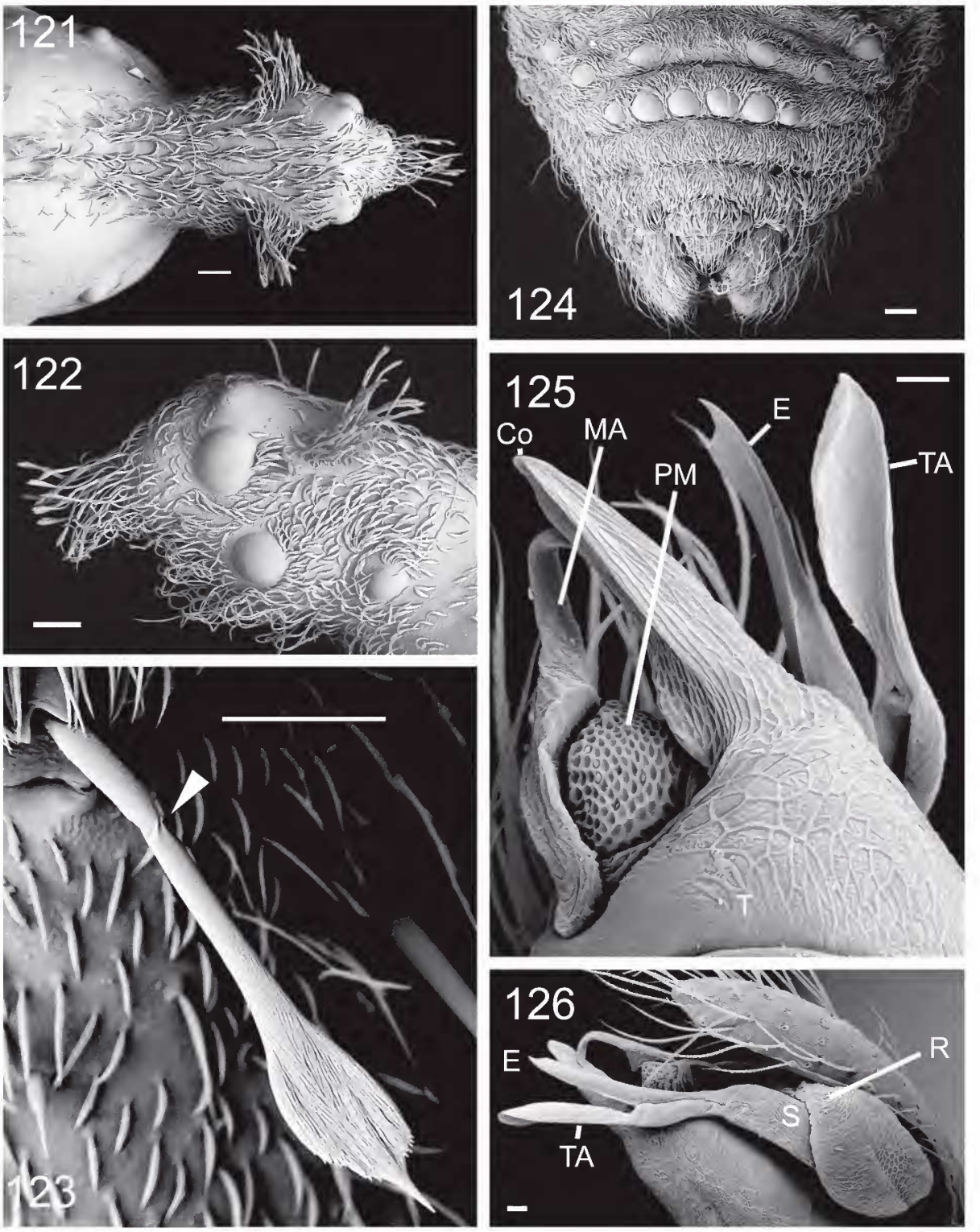
Description. **Female**. The holotype is in poor condition and is fragile. A more recently collected specimen, which is a good physical match for the holotype (except in abdominal shape), is described here. Carapace length range: 4.00–5.83. *Drawn specimens* Figures: 30, 127–131, KS86345 (male from Fig. 148); 132–133, S42562; 134–135, 138–139, S42503; 140–143, holotype (NMV).

Female S42562. *Prosoma*. Carapace (Figs 127, 130–131), length 5.83, width 4.17, height 1.47; broad and low (Fig. 131), lateral margins at coxa I straight or concave (Fig. 130); eye tubercle well developed, relatively slender and slightly elevated (Fig. 127). Chelicerae: paturon with 4 promarginal teeth. Labium: length 0.65, width 1.0. Sternum: length 2.37, width 2.37; sternal extensions at bases of legs II–IV (Fig. 129). • *Eyes*. (Figs 127, 131). AME>PME> ALE>PLE; ALE c. 0.5× its own diameter from AME; ventral margin of ALE is just ventral to mid point of AME. • *Legs*. (Figs 127). P+TL I: 8.58, II: 7.92, III: 4.67, IV: 6.08; front



Figs 117–120. Australian *Poltys columnaris*-group male palps, ventral and prolateral terminal bulbus. 117–118, *P. jujorum*. 119–120, *P. milledgei*. Scale lines = 20 μm.

femora distinctly broadened with greatest diameter c. ⅗ way to apex. • *Abdomen*. (Figs 127–128, [holotype Figs 142–143]). Length 11.25, width 8.00; broadest at small tubercles just anterior to main apodemes; "microsigillae" well developed. • *Epigyne*. (Holotype). Spade-like (as in cards), widest point less than half-way to tip (Fig. 140); distal tip expanded into paired lobes posteriorly (Figs 140–141); foveae wide and relatively shallow but well separated from lateral margins (Fig. 140, also see Fig. 139), narrowing into short copulatory ducts basally (as in Fig. 30); spermathecae closely spaced; epigyne often lightly sclerotized compared to *P. illepidus*-group and *P. laciniosus*-group. • *Colour in alcohol*. (S42562) Carapace yellow, pro-foveal suture red, eye tubercle orange brown, carapace margins ventral to lateral eyes brown. Chelicerae orange-brown with pale patch basally. Labium and maxillae orange-brown. Pedipalps yellow-olive.



Figs 121–126. 121–124, *Poltys jujorum* female: 121–122, anterior carapace and eye tubercle (from moult), dorsal and lateral, showing tufts of setae; 123, flattened macroseta from dorsal patella; 124, posterodorsal abdomen showing maculae. 125–126, *P. frenchi* male palp: 125, terminal bulbus, ventral; 126, bulbus, retrolateral. Scale lines: Figs 121–124 = 100 μm; Figs 125–126 = 20 μm.

Femora I and II orange-yellow with darker distal band; femur III mottled pale and brown; femur IV pale basally to dark distally; distal legs mottled orange–brown. Sternum orange-brown. Abdomen ventrally fawn, dorsally with brown and black markings on a pale ground. Fresh specimens usually have pale creamy-grey dorsal carapace.

Male. Carapace length range: 0.94–1.10. *Drawn specimens* Figures: 29, KS86338; 148–151, KS86342; 152–154, KS86338.

Male KS86342. *Prosoma*. Carapace: length 1.04, width 0.78, height 0.33; broad pear-shape in dorsal view but lateral margins at coxa I straight to concave (usually straight–convex in other species) (Fig. 150); eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral

view, slightly elevated (Fig. 148). Labium: length 0.10, width 0.18. Sternum: length 0.45, width 0.44. • *Eyes*. (Figs 148, 151). AME≥PME>ALE≥PLE; ALE c. ½ × its own diameter from AME; height of ventral margin of ALE is at mid point of AME; AME prominent on slight tubercles. • *Legs*. (Fig. 148). P+TL I: 1.29, II: 1.18, III: 0.63, IV: 0.88. • *Abdomen*. (Figs 148–149). Length 1.63, width 1.00; a narrow ellipsoid, broadest at ⅔ height. • *Palpal organ*. Radix–stipes joint retrolateral (Fig. 153), stipes directed apically, not hidden by cymbium; embolus and TA arise retroapically (Figs 126, 154); embolus a slender slightly curved rod, ventral groove visible under SEM (Fig. 125–126, 152); TA adpressed to embolus basally, free retrolaterally apically (Figs 126, 154); PM a curved plate with reticulated surface, less heavily sclerotized than *P. laciniosus*-group (Fig. 125, 153). • *Colour in alcohol*. Carapace pale olive-grey with black median markings; eye tubercle bright orange, with black around eyes and between AME, giving "masked" appearance. Chelicerae as carapace with fuscous markings. Labium pale with fuscous edging to basal part, maxillae darker. Femora I, II and IV pale basally to dark distally (IV darkest); distal legs mottled fuscous, turning into distinct dark banding on distal metatarsi and tarsi; underside of tibia–metatarsus III with large black spots that merge together. Sternum pale anteriorly with dark lateral and posterior borders. Abdomen ventrally greyish-fawn, dorsally with dark pattern on a white ground.

Variation. The types of *P. frenchi* and *P. sigillatus*, plus the described Cooktown specimen (S42562), correspond in width of epigynal foveae, colouration and general build. All the other females examined are slightly more lightly built, the carapace is more lightly coloured, and the epigynal foveae are narrower (Fig. 139). The abdominal shape of the figured female (Fig. 128) seems to be common in *P. frenchi* specimens in Australia but overall the variations in shape are similar to those seen in the *P. laciniosus*-group, including tall twig-like forms (Fig. 134) and ones with dual humeral tubercles and central "tower". More darkly coloured and heavily built specimens can also resemble *P. illepidus*-group, especially when swollen with eggs.

Biology. The biology of *P. frenchi* appears to be as described for other Australian *Poltys* species except that many webs have a slight extension at the top made by adding an extra zigzag of sticky spirals (although other species may have uneven webs to fit the available space). Only one adult female web has been observed, 17 cm high× 14 cm wide, with the hub fully eaten out (Fig. 12). These spiders are less reliant on dead vegetation than most other Australian species, often being found on living or dead vines as well as other twigs, and commonly with green pigmentation in the cuticle and on the abdomen. Two egg sacs laid in captivity were of cream-coloured silk with lemon-yellow covering; one had a sparse outer layer, the other was rather thicker and smoothly finished (*P. illepidus* egg sacs are always loosely finished). In Australia, *P. frenchi* is restricted to low-altitude, but mostly slightly scrubby, rainforest with openings (*P. noblei* n.sp. is restricted to higher altitudes at a similar latitude). One female (S42562) was collected from the larval provisions in a mudwasp nest.

Distribution. Northern Australia, New Guinea and southern Moluccas (Indonesia) (Fig. 158).

Poltys timmeh n.sp.

Figs 136–137, 144–147, 155–157, 158.

Etymology. The specific name is an arbitrary combination of letters.

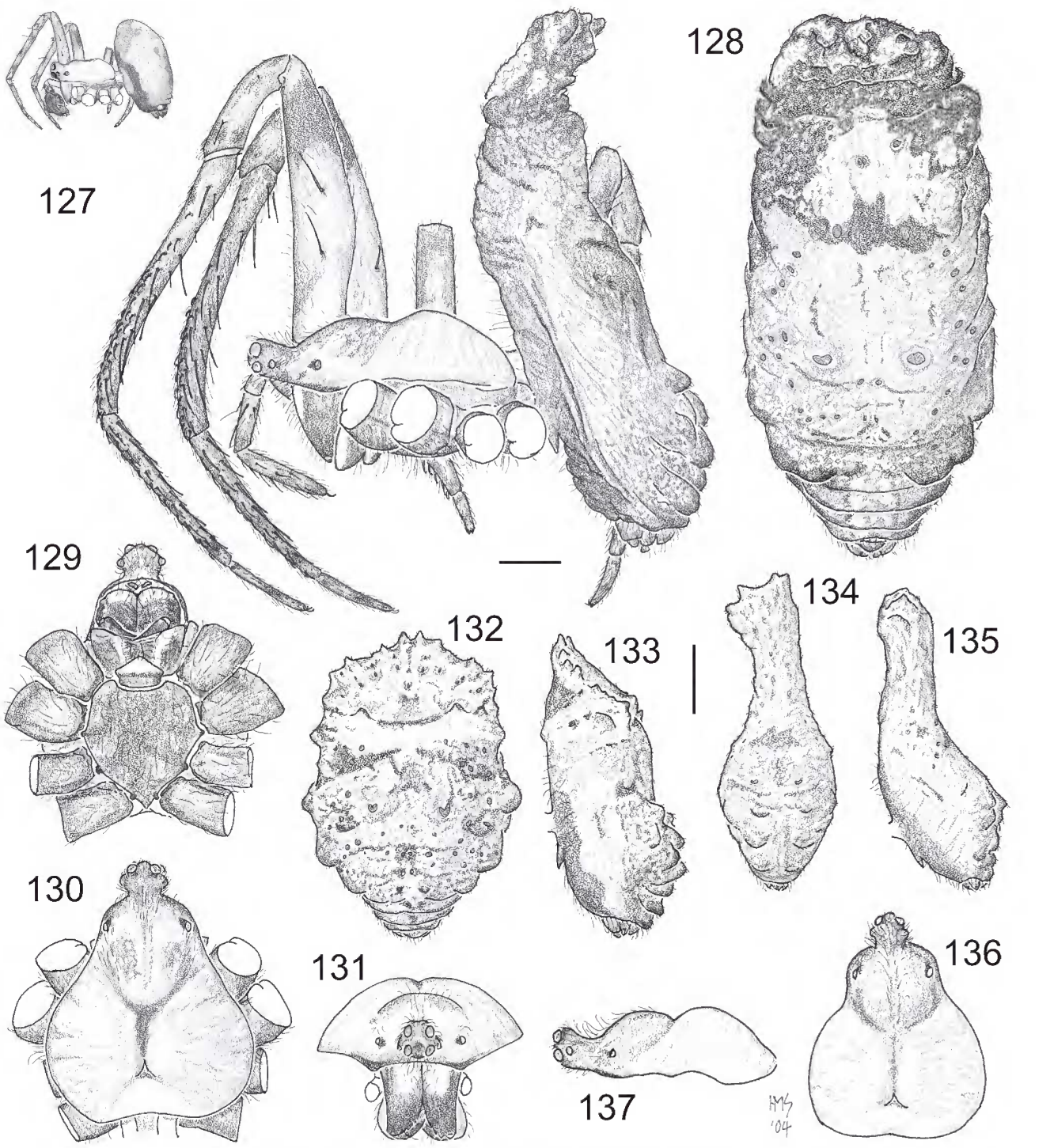
Type material. NEW CALEDONIA: HOLOTYPE ♀ (HNHM), Lifou, Loyalty Islands, c. 20°43'S 167°15'E, 16 Aug. 1982, rainforest, beating. PARATYPES ♂ (HNHM), data as holotype; ♀ KS86349, Tiea Reserve, 5 km E of Pouembout, 21°08'06"S 164°56'11"E, 4 Nov. 2001, T. Moulds, 36 m; ♂ (BPBM), Lifou, Loyalty Islands, 26–27 Mar. 1968, J.L. Gressitt & T.C. Maa; ♂♀ (AR14306–7 MNHNP, ex HNHM), Maré, Loyalty Islands, c. 21°30'S 168°00'E, 26 May–8 Jun. 1987 and 7 Jun. 1986 respectively, *Araucaria*; ♂ (HNHM), Farino, 21°40'S 165°46'E, 25 Aug. 1982; ♀ S66578, New Caledonia, Foret Nord, site 2, 22°19'S 166°55'E, 2 Dec. 2004, QM party, rainforest, 200 m, night hand collecting.

Other material examined. ♀ S69840, New Caledonia, Pic du Grand Kaori, site 2, 22°17'S 166°53'E, 22 Nov. 2004, QM party, rainforest, 250 m, night hand collecting.

Diagnosis. **Females**. From other species groups, as *P. frenchi*, except number of prolateral cheliceral teeth is variable. From *P. frenchi* by broader and longer epigynal foveae that extend basally almost to the position of the spermathecae (Fig. 144), also by carapace shape (Figs 136–137), and rather shorter legs with more distinctly broadened femora. **Males**. From other species groups, as *P. frenchi* for palpal characters (no recently collected specimens seen to comment on colouration). From *P. frenchi* by longer, lobed conductor with distinct basal kink (Figs 155, 157) and that most of the sclerites are longer in proportion to the tegulum and subtegulum (compare ventral views, Figs 156 and 153).

Description. **Female**. Carapace length range: 2.94–3.67. *Drawn specimens* Figures: 136–137, KS86349; 144–147, holotype (HNHM) ex Lifou.

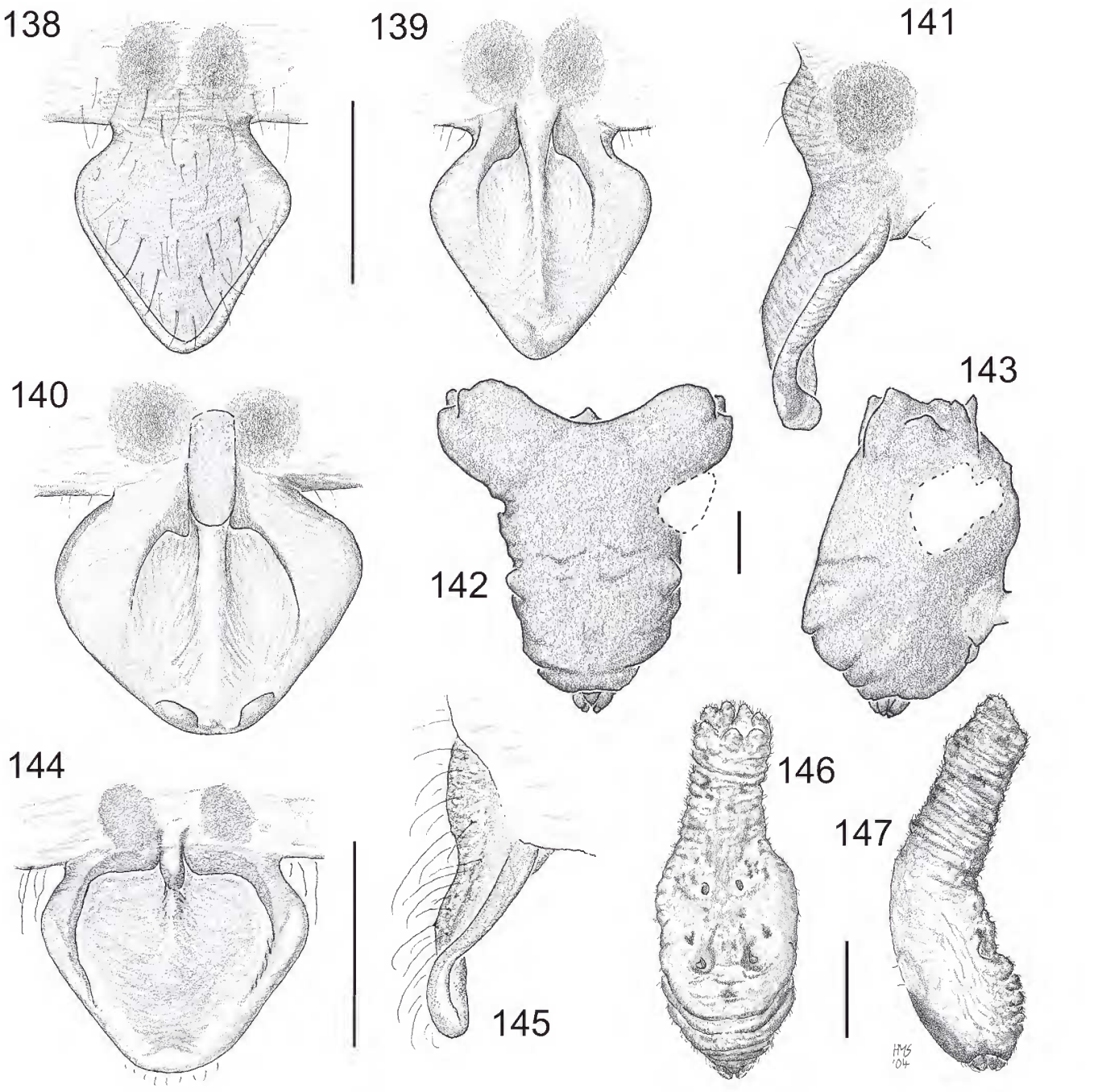
Holotype. *Prosoma*. Carapace: length 3.67, width 2.90, height 0.82; broad and relatively low, rear of caput slopes steeply into pro-foveal suture; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated (Figs 136–137). Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.43, width 0.61. Sternum: length 1.67, width 1.55; sternal extensions at bases of legs III–IV. • *Eyes*. (Fig. 137). AME>PME>PLE≥ALE; ALE c. ⅗× its own diameter from AME; ventral margin of ALE level with mid point of AME. • *Legs*. P+TL I: 4.90, II: 4.57, III: 2.90, IV: 3.67; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or ½ way leg II; legs distinctly shorter than *P. frenchi*. • *Abdomen*. (Figs 146–147). Length 7.92, width 3.00; broadest at anterior apodemes; some "microsigillae" visible but not strongly developed. • *Epigyne*. (Figs 144–145). Spade-like (as in cards), widest point less than half-way to tip; foveae broad and shallow (thin in lateral view, Fig. 145), occupying almost the entire posterior surface, narrowing abruptly into short, narrow copulatory ducts basally (Fig. 144); spermathecae closely spaced. • *Colour in alcohol*. Carapace creamy-white, caput straw yellow, black around all eyes. Chelicerae cream, labium, maxillae and sternum yellow. Pedipalps cream. Femora I and II pale creamy-yellow with remains of dark distal band (with blue shine on recent specimen); femur III almost all cream; femur IV paler basally and distally, dark brown between; distal legs mottled yellow–cream, faint dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally blackish posteriorly, dorsally and anteroventrally with brown and black markings on a pale ground.



Figs 127–137. *Poltys frenchi*-group, female characters. 127–135, *P. frenchi*: 127, general lateral view with male at same scale; 128, abdomen, dorsal; 129, prosoma and coxae, ventral; 130, carapace and coxae, dorsal; 131, frontal carapace and chelicerae; 132–135, examples of variation in abdominal shape, dorsal and lateral (also see group holotypes, Figs 142, 146). 136–137, *P. timmeh*, carapace, dorsal and lateral. Scale line: 1 mm for Figs 127–131, 136–137; 2 mm for Figs 132–135.

Male. Carapace length range: 0.98–1.43. *Drawn specimen* Figs 155–157 (BPBM) ex Lifou.

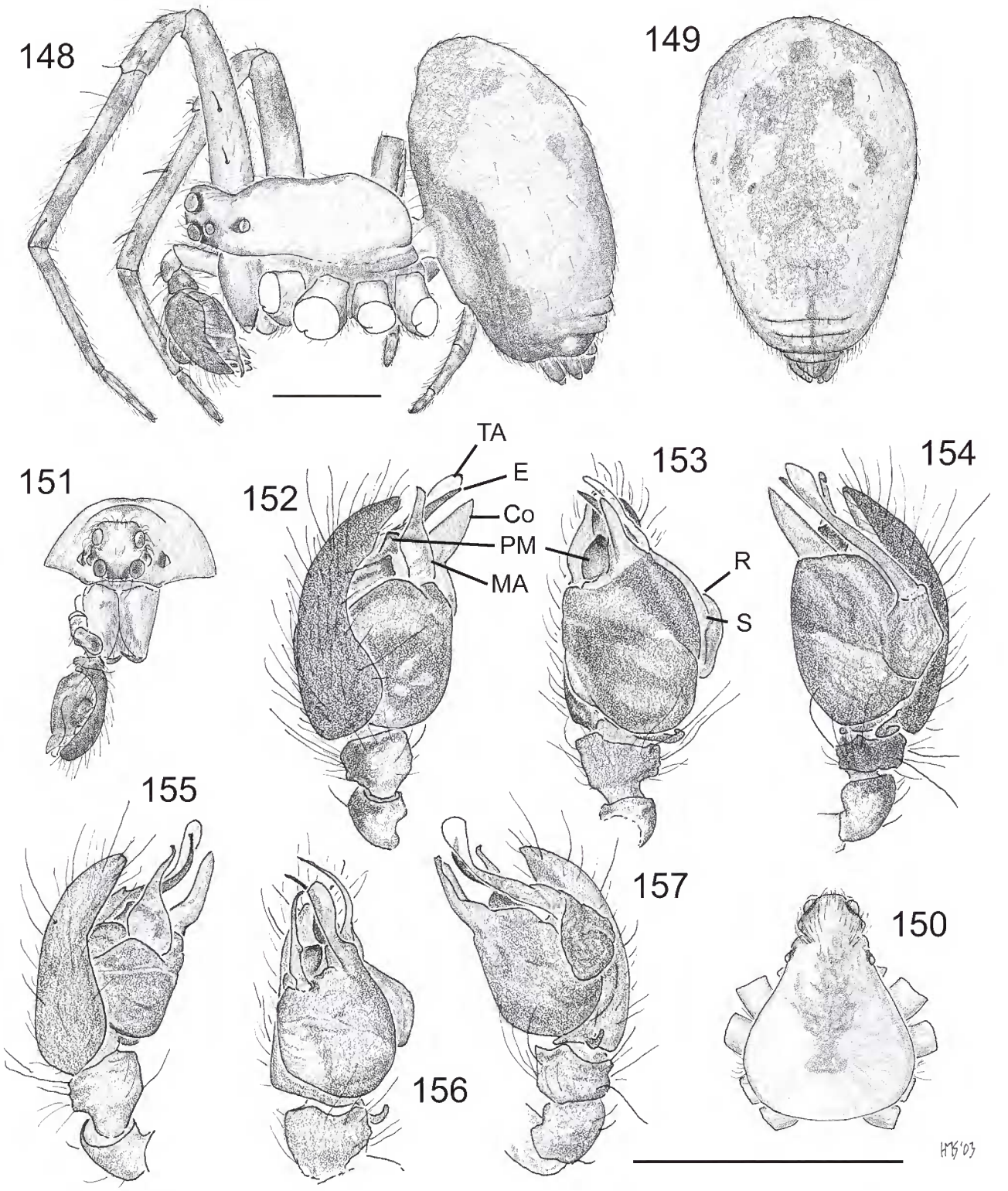
Male (HNHM) ex Lifou. *Prosoma*. Carapace: length 1.43, width 0.98, height 0.41; broad pear-shape in dorsal view; eye tubercle well defined both in lateral and dorsal views (carapace similar shape to that shown for larger *P. noblei* male, Fig. 204), slightly elevated and PME slightly overhanging AME. Labium: length 0.14, width 0.26. Sternum: length 0.61, width 0.57. • *Eyes*. AME>PME≥ PLE>ALE; ALE almost touching AME; height of ventral margin of ALE is just ventral to mid point of AME; AME prominent on slight tubercles. • *Legs*. P+TL I: 1.76, II: 1.65, III: 0.86, IV: 1.12. • *Abdomen*. AL 1.61, width 1.06; an almost evenly elongate ellipsoid; anterior margin slightly crenate, with submarginal "microsigillae"; apodemes well developed for a male. • *Palpal organ*. (Figs 155–157).



Figs 138–147. *Poltys frenchi*-group epigynes and holotype abdomens. 138–143, *P. frenchi*: 138–139, narrow form, epigyne anterior then posterior view; 140–143, holotype: 140–141, epigyne posterior and lateral; 142–143, abdomen, dorsal and lateral (missing section is damaged). 144–147, *P. timmeh* holotype: 144–145, epigyne, posterior and lateral; 146–147, abdomen, dorsal and lateral. Scale lines: 0.5 mm for epigynes; 2 mm for abdomens.

Radix–stipes joint retrolateral, stipes directed apicoventrally, not hidden by cymbium; embolus and TA arise retroapically (Figs 156–157); conductor deeply grooved, retrolaterally expanded into rounded flap (Fig. 156), distinctly kinked basally (Fig. 155, 157); embolus longer than in *P. frenchi*, a slender sinuously curved rod (but not examined under SEM, so groove may be present, as in *P. frenchi*) (Fig. 155); TA adpressed to embolus basally, free retrolaterally apically (Fig. 157); PM a curved plate (Fig. 156), appears similar to that of *P. frenchi* but microstructure unknown. • *Colour in alcohol*. Carapace amber brown with darker caput; eye tubercle with orange dorsally, secondary eyes with black around, AME surround pale. Chelicerae brown to yellow distally. Sternum dark yellow with dark margins. Femora amber-olive; lower front legs yellow-olive dorsally, dark ventrally; rear legs mottled; all legs with distinct dark banding on distal metatarsi and tarsi. Abdomen dark ventrally and dorsal margins; main dorsal area pale with uneven central brown patch.

Variation. Some female specimens of *P. timmeh* have three promarginal cheliceral teeth whilst others have four. The range of abdominal variation is probably similar to that seen in *P. frenchi*.



Figs 148–157. *Poltys frenchi*-group males. 148–154, *P. frenchi*: 148, general lateral view; 149, abdomen, dorsal; 150, carapace and coxae, dorsal; 151, frontal carapace, right palpal organ and chelicerae. 152–154, male palp: prolateral, ventral, retrolateral. 155–157, *P. timmeh*, male palp, views as previous. Scale lines = 0.5 mm, upper line for Figs 148–151, lower for palps.

Biology. Tim Moulds, the collector of the AM specimen informs me he was beating mainly living plants in lowland vine scrub. Some other labels give rainforest as the habitat. These descriptions would agree with the favoured habitat of *P. frenchi* in Australia. Several other specimens (including some unlisted juveniles in HNHM) were collected on *Araucaria*.

Distribution. Only recorded from New Caledonia and the Loyalty Islands (Fig. 158).

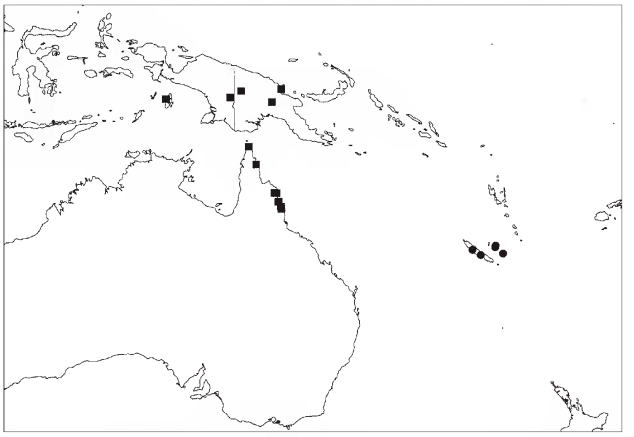


Fig. 158. Distribution of *Poltys frenchi*-group species: *Poltys frenchi* (■); *Poltys timmeh* (●).

The *Poltys laciniosus* species group

This is a distinct species group that appears to be endemic to Australia. The group is united by several characters: a reduced prolateral cheliceral tooth pattern; females with a more steeply domed carapace than normally found in other groups; long, roughly triangular epigynes with rolled in lateral posterior plates; relatively long copulatory ducts; and no TA in the male palp. Along with the (presumed) loss of a TA, associated palpal organ structures such as stipes and distal haematodocha are difficult to distinguish and may, or may not be present. For convenience, the basal part of the embolus, which expands into a membranous sac, has been termed stipes in the following descriptions. No modification of patellal macrosetae has been noted in the group. The three species are all variable in abdominal shape (see Smith, 2003) and colouration. This level of variation may be an adaptation to avoid predation in their often exposed day time hiding positions on dead twigs.

Poltys laciniosus Keyserling

Figs 10–11, 18, 22–24, 31–32, 159–163, 169–171, 174, 176–177, 182–188, 198–201, 208–210, 217, 218–219.

Poltys laciniosus Keyserling, 1886: 123, pl. 9, fig. 7. Female holotype from Peak Downs, Queensland, Australia; in BMNH (1890/2050), examined.

Poltys mammeatus Keyserling, 1886: 125, pl. 10, fig. 1. Female holotype from Peak Downs, Queensland, Australia; in ZMH (labelled as the type of *P. laciniosus*, see remarks below), examined. **New synonym**.

Poltys bimaculatus Keyserling, 1886: 131, pl. 10, fig. 4. Juvenile holotype from Peak Downs, Queensland, Australia; in ZMH, examined. **New synonym**.

Poltys salebrosus Rainbow, 1904: 104, fig. 28–29. Juvenile holotype from Freemantle [sic], Western Australia, Australia; in AM (KS8697). **New synonym**.

Remarks. Both BMNH and ZMH hold types listed as the holotype of *P. laciniosus*. The BMNH specimen is a good match for the specimen illustrated by Keyserling under this name. A designated type of *P. mammeatus* has not been located but the ZMH specimen matches the colour pattern of the illustration. The shape is difficult to match with certainty, as the apex of the abdomen is inclined sharply over the prosoma, and posterior tubercles are not obvious. The specimen, however, is not in good condition and the abdomen has obviously been damaged. The ZMH type, therefore, has apparently been mislabelled as *P. laciniosus* and should read *P. mammeatus*. The subadult types of *P. bimaculatus* and *P. salebrosus* are both from areas where no other *Poltys* species have been recorded and have features typical of *P. laciniosus*.

Selected other material examined. AUSTRALIA: NEW SOUTH WALES: ♂ KS84599, 60 km W of Cobar, 31°33'04"S 145°12'56"E, 26 Mar. 2002; ♂ KS84600, 62 km W of Nyngan, 31°33'31"S 146°32'49"E, 26 Mar. 2002; ♂ KS70366, The Battery rest area, 32°12'S 150°28'E, 29 Oct. 2000; ♀ KS78296, Cocoparra NP, 34°04'46"S 146°13'23"E, 15 Mar. 2002; ♂♂ KS78293–94, Conimbla NP, 33°47'47"S 148°26'53"E, 14 Mar. 2002; ♀ KS33847, Euchora, Springwood, 33°42'S 150°34'E; ♀ KS33845, Gara Station, via Armidale, 31°36'S 148°54'E; ♂ KS72253, Gilwarny Forest Rd, 30°25'20"S 147°53'57"E, 15 Dec. 1999; ♂ KS74967,♀ KS75494, Pilliga Forest Way, 30°31'11"S 149°37'25"E, 13 Nov. 2001; ♀ KS58687, Royal National Park, 34°08'S 151°04'E, 29 Oct. 1998; ♀♂ KS74960–61, Warrumbungle NP, 31°18'S 149°00'E, 9 Nov. 2001. NORTHERN TERRITORY: ?♀ KS55745, Gregory NP, Victoria H'way, 15°31'04"S 131°18'23"E, 25 May 1999. QUEENSLAND: ♂♂ KS5806, Blackwood NP, 21°28'41"S 146°43'33"E, 11 May 2000; ♂ KS58043,♀ KS84601, Clermont, 22°48'25"S 147°38'22"E, 9 May 2000; ♂ KS58060,♀ KS58059, Isla Gorge, campsite area, 25°11'32"S 149°58'25"E, 7 May 2000; ♂ KS58051,♀♀ KS58050 (3), Peak Range NP via 'Limestone', 22°45'26"S 148°08'03E, 10 May 2000; ♂♂ KS5804,♀ KS58042, Taunton NP, 23°29'33"S 149°16'39"E, 9 May 2000; ♂ KS58056, Theodore, 24°56'41"S 150°04'24"E, 10 May 2000; ♀ (MMUS) Duaringa, 23°41'S 149°40'E; ♀ (MMUS), Innot Hot Springs, 17°40'S 145°14'E; ♀ S42616, Altonvale Station, 28°01'S 149°15'E, 10 Jan. 1979; ♂ S42558, Blackdown Tableland, 23°47'S 149°04'E, 6 Feb. 1981; ♀♀ S42501, Camel Creek, 18°50'S 145°28'E, 5 Dec. 1955; ♀♀ ex S42608–09, Camira, 27°38'S 152°55'E, 23 Nov. 1986; ♀ S42500, Crows Nest, 27°16'S 152°03'E, 27 Jan. 1973; ♀ S42612, Dulacca, 26°38'S 149°48'E, 1 May 1928; ♀ S42551, Eidsvold, 25°22'S 151°07'E, Feb. 1915; ♀ S42591, Goondiwindi, 28°32'S 150°18'E, Jan. 1951; ♀ S42560, Mt Moffat NP, 24°53'S 147°57'E, 15 Dec. 1987; ♀ W1444, Purga, 27°41'S 152°42'E, 15 Dec. 1941; ♀ W1503, Rockhampton, 23°22'S 150°30'E, 26 Jun. 1942; ♀ W434, Toogoolawah, 27°05'S 152°22'E; ♀ S42550, Yandaburra, 24°13'S 148°00'E, 16 May 1976. SOUTH AUSTRALIA: ♀ KS78314, Arden Vale Rd, 5.1 km from Quorn, 32°18'08"S 138°00'49"E, 24 Mar. 2002; ♂ KS84596, Cocata Conservation Reserve, 33°17'28"S 135°18'59"E, 22 Mar. 2002; ♀ KS78310, nr Coffin Bay NP, 34°37'26"S 135°27'04"E, 22 Mar. 2002; ♂ KS78309,♀ KS85050, Lake Gilles NP, 33°01'56"S 136°47'45"E, 21 Mar. 2002; ♂ KS84598,♀ KS78313, Lincoln H'way, 41 km N of Cowell, 33°21'28"S 137°03'58"E, 24 Mar. 2002; ♂ KS84597,♀♀ KS78311, Lincoln NP, 34°47'11"S 135°55'04"E, 23 Mar. 2002; ♀ KS78304, Millbrook Reservoir, 34°50'S 138°49'E, 19 Mar. 2002; ♂ KS91165, raised from female KS78304, Millbrook Reservoir, matured 30 Nov. 2002; ♀ KS78307, Mt Remarkable NP, 32°50'45"S 138°01'41"E, 20 Mar. 2002; ♀♂ KS78301–02, Ngarkat Conservation Park, 35°38'17"S 140°46'50"E, 17 Mar. 2002; ♂ KS84593, Scorpion Springs CP, 35°25'10"S 140°53'20"E, 17 Mar. 2002; ♀ NN12173, Billiatt CP, 34°59'23"S 140°28'24"E, 19 Nov. 1996; ♀ NN12178, Calpatanna Waterhole CP, 33°00'S 134°21'E, 27 11 1995; ♀ N1998771, Gawler Ranges, 32°22'S 135°34'E, Sep. 1972; ♀ N1998778, 13 km N Keilira Station, 36°37'S 140°10'E, 22 Mar. 1992; ♀♀ (4) (SAMA), Munyaroo CP, 13.7 km SE Moonabbie, 33°21'34"S 137°21'03"E, 30 Sep. 2002; ♀ NN12166, Murvio Homestead, 36°12'41"S 140°07'46"E, 3 Oct. 2000; ♀ NN12176, Pinkawillinie CP, 33°03'S 135°50'E, 23 Nov. 1995; ♀ N1998775, Tailem Bend, 35°15'S 139°28'E, Mar. 1947; ♀ N1998776, 4 miles E Wellington, 35°18'S 139°27'E, 13 Aug. 1994. VICTORIA: Juvenile♀, Boinka Flora Reserve, 35°11'46"S 141°36'39"E, Oct. 1999 (probably this species, close to recorded distribution in SA). WESTERN AUSTRALIA: ♂ KS59255, Eucla roadhouse, 31°41'S 128°52'E, 7 Oct. 1999; ♂ KS59256, Pemberton, 34°27'S 116°02'E, 10 Oct. 1999; ?♀ WA98/1957, Beta Ck, 14°16'S 127°19'E, 20 Sep. 1996; ♀ WA98/1959, Gnowangerup, 33°56'S 118°00'E, 15 Nov. 1965; ♀ WA98/1960, Grasspatch, 33°14'S 121°43'E, 24 Dec. 1988; ♀ WA36/68, Lowden, 33°32'S 115°58'E, 10 Jan. 1936; ♀ WA39/2340, Maddington, 32°03'S 115°59'E, 27 Sep. 1939; ♀ WA98/1966, South Yardie Well, Cape Range, 22°25'S 113°46'E, 24 May 1995; ♀ WA98/1970, Torndirrup NP, 35°05'S 117°55'E, 25 Apr. 1990; ♀ WA27/305, Wooroloo, 31°48'S 116°19'E, Mar. 1927.

Reared specimens deposited in Australian museums: ex female KS78304: ♂ ♀ to NTM, ♂ to QM S66577, ♂ to SAMA NN21924, ♂ to WAM T63010; ex female KS78313: ♂ to NMV K8898, ♀ to NMV K8899, ♂ to SAMA NN21925.

Diagnosis. Females. From other species groups: epigyne as long or longer than wide, widest at base (Fig. 182); prolateral cheliceral teeth usually LLs (i.e. missing one small tooth, Fig. 163); carapace profile relatively high (Fig. 162); well defined eye tubercle (Fig. 159); front femora with distinct broadening. From *P. noblei* and *P. grayi*: carapace dark (Fig. 159), broadly blunt tip to epigyne and (except Kimberley and Northern Territory specimens) almost total reduction of the posterior median plate distal to the base (Figs 182–185). **Males**. From other species groups by the male palp: the embolus arises prolaterally without a terminal apophysis (Figs 210, 218). From *P. noblei* and *P. grayi* by longer embolus without a terminal flange (Fig. 209); conductor tip angled strongly towards prolateral (Figs 209, 219). Length of embolus slightly shorter in Western Australian specimens. Males are unknown from the Kimberley and Northern Territory, but the embolus length may be reduced where females have a short epigyne.

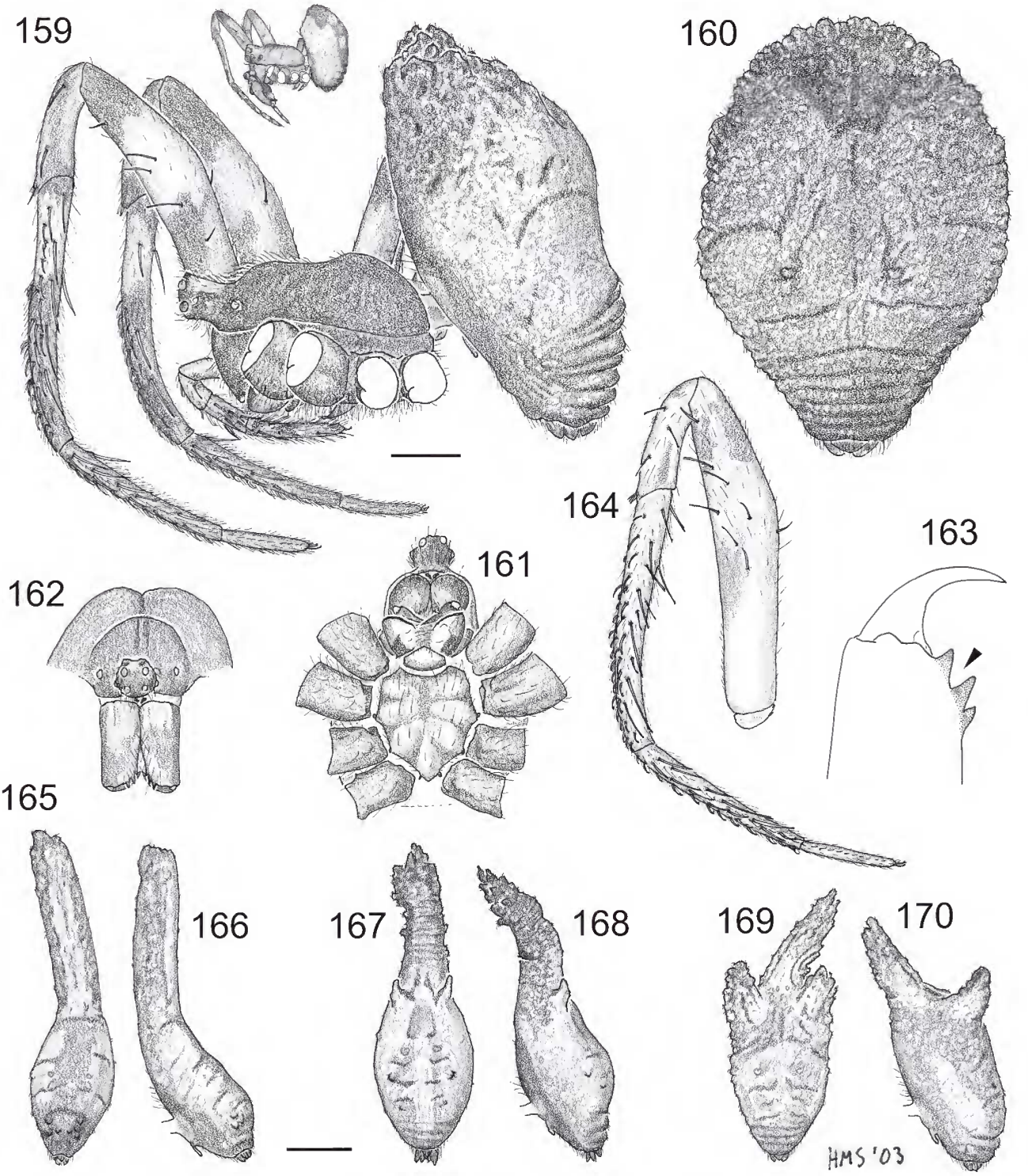
Description. Female. Carapace length range 2.82–4.49. *Drawn specimens* Figures: 32, KS78299; 159–161, KS78300 (male from Fig. 198); 162, 171, 174, 176–177, 182, 186, BMNH1890/2050 (holotype); 163, KS85050; 169–170, NN12173; 183, KS58050; 184–185, KS78310; 187–188, KS55745 (?*P. laciniosus*).

Holotype. *Prosoma*. Carapace: length, 3.80, width 2.82, height 1.18; relatively wide but tall (Figs 171, 162); eye tubercle well developed, slender basally, slightly elevated, with well developed dorsal protrusions above PME that point anteriorly (Figs 159, 174). Chelicerae: paturon with 3 promarginal teeth (Fig. 163). Labium: length 0.41, width 0.78. Sternum: (Fig. 161) length 1.59, width 1.55; sternal extensions at bases of legs III–IV. • *Eyes*. (Figs 162, 174). AME=PME>ALE=PLE; ALE <0.2× its own diameter from AME; ventral margin of ALE is just ventral of mid point of AME. • *Legs*. (Fig. 159). P+TL I: 5.92, II: 5.50, III: 3.00, IV: 4.00; front femora distinctly broadened with greatest diameter c. ⅗ way to apex in leg I, or ½ way, leg II. • *Abdomen*. (Figs 176–177, also see other shapes shown for the group in Figs 159–160, 165–170 and 178–181). Length 8.70, width 4.78; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne*. Tongue-like, widest point at base; lip broad either side of tip (Fig. 182); foveae merged almost from base into single, deep opening (Figs 183, 186); lateral plates curve ventrally either side of slight ridge of reduced median plate, basally forming tubes that lead into copulatory ducts; ducts not examined in holotype but usually pass anterior to spermathecae then wrap around dorsally to enter dorsally or posteriorly (Fig. 32); ducts separated along whole width; spermathecae separated by at least a single spermatheca width. • *Colour in alcohol*. Carapace and most of caput olive-brown, anterior caput colour fades into yellow patch on dorsal eye tubercle. Chelicerae brown, paler basally and with orange on distal inner faces. Labium, maxillae and sternum orange-tan. Pedipalps yellow, mottled with brown distally. Femur I dark brown and orange with broad yellow band (dark areas with strong blue sheen on recent specimens); femur II similar but yellow band rather vague; femur III mottled to dark distally; femur IV dark to paler in distal third; distal legs mottled with yellow/orange and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen generally dark grey ventrally except paler book lung covers; dorsally with grey, brown and black markings on a pale ground. Note in recent specimens the yellow/orange against black banding on the front femora can be striking and may be used to startle potential predators (Fig. 11). The dorsal carapace and caput are usually a rich dark brown against which the white hairs on the caput stand out strongly.

Male. Carapace length range 0.78–1.31. *Drawn specimens* Figures: 31, KS91165; 198–201, KS58060; 208–210, KS58051.milledg

Male KS58060. *Prosoma*. Carapace: length 0.86, width 0.69, height 0.31; a broad pear-shape in dorsal view (Fig. 200); height subequal at eye tubercle and fovea; eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral view (Fig. 198), less well defined in dorsal view; with strongly developed dorsal protrusions above PME, pointed anteriorly (Figs 198, 200–201). Labium: length 0.08, width 0.18. Sternum: length 0.40, width 0.44. • *Eyes*. (Figs 198, 201) AME≥PME>ALE≥PLE; ALE almost touching AME; ventral margin of ALE is ventral to mid point of AME. • *Legs*. (Fig. 198) P+TL I: 1.08, II: 1.00, III: 0.55, IV: 0.69. • *Abdomen*. (Figs 198–199, also see 202). Length 1.25, width 0.98; ellipsoid, broadest at ⅔ height. • *Palpal organ*. Radix–stipes joint almost basal, stipes wraps margin of retrobasal subtegulum, not hidden by cymbium (Figs 209–210, 218); no TA; distal embolus wire-like, long, grooved and strongly arcing over apex of palp, roughly parallel to edge of cymbium, ending in a small barb (Figs 209, 218); PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized (Figs 209, 219). • *Colour in alcohol*. Lateral carapace pale olive, caput darker olive, both with black median markings; eye tubercle orange, with brown points to protrusions dorsal to PME; dark brown round AME. Chelicerae, labium, maxillae and sternum olive. Sternum with fuscous edges and median streak. Femora pale olive, darkening distally; distal legs mottled fuscous turning into dark banding on distal metatarsi and tarsi. Palpal cymbium olive brown with darker patches, tibia fuscous, patella fuscous dorsally, femur and ventral patella creamy-white. Abdominal book lung covers and posterior to epigastric fold pale, surrounding ventral areas olive darkening to black at spinnerets; dorsally with olive–brown and black pattern on a pale ground.

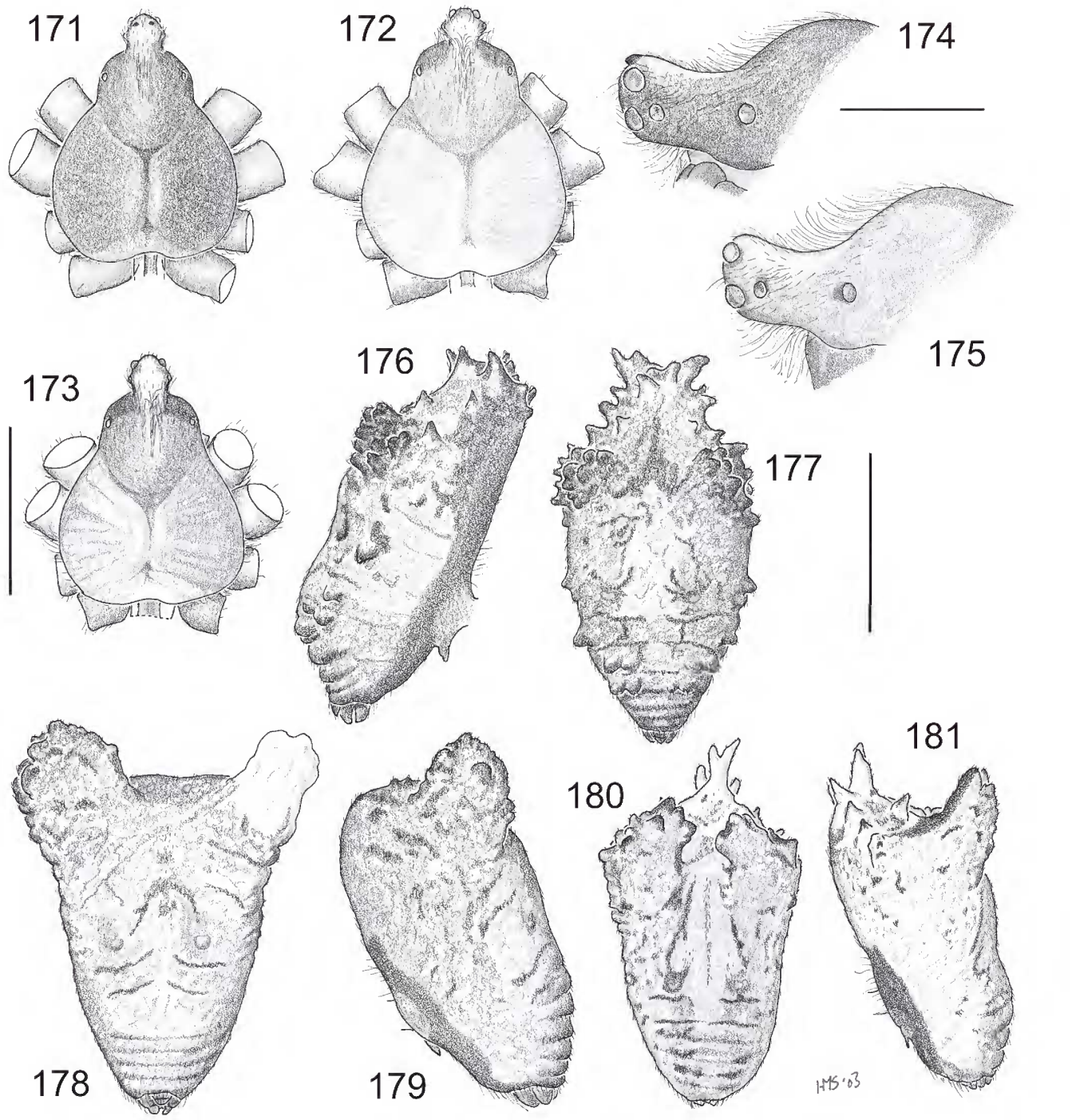
Variation. There is considerable variation in epigyne size and shape of *P. laciniosus* females. Specimens from all parts of Australia and representing all extremes of epigyne shape were included in the COI DNA analysis. Although this showed some minor variations in sequences, no consistent differences were found. The partial reduction of the posterior median plate and the unusually short length of the epigynes of the two specimens from the Northern Territory and the Kimberley (Figs 187–188) are unique characters amongst the *P. laciniosus* specimens examined. Before the results for the DNA sequence were obtained these two specimens had been assumed to be of a different species, but the sequences indicate that all the tested specimens are conspecific. It is possible that contamination has occurred (unlikely as sequencing was repeated from the original extract) or that the one short sequence examined is not useful in this case. The status of these specimens should be re-examined when males are available from the area or if further



Figs 159–170. *Poltys laciniosus*-group, female characters. 159–163, *P. laciniosus*: 159, general lateral view with male at same scale; 160, abdomen, dorsal; 161, prosoma and coxae, ventral; 162, carapace and chelicerae, frontal (holotype); 163, left chelicera and fang, prolateral. 164, *P. grayi*, leg I, prolateral. 165–170, examples of variation in abdominal shape seen in all species, dorsal and lateral (also see holotypes, Figs 176–181), (165–166, *P. noblei*; 167–168, *P. grayi*; 169–170, *P. laciniosus*). Scale lines: upper 1 mm for Figs 159–162, 164; 0.25 mm for Fig. 163; lower line 2 mm for Figs 165–170.

DNA studies are carried out.

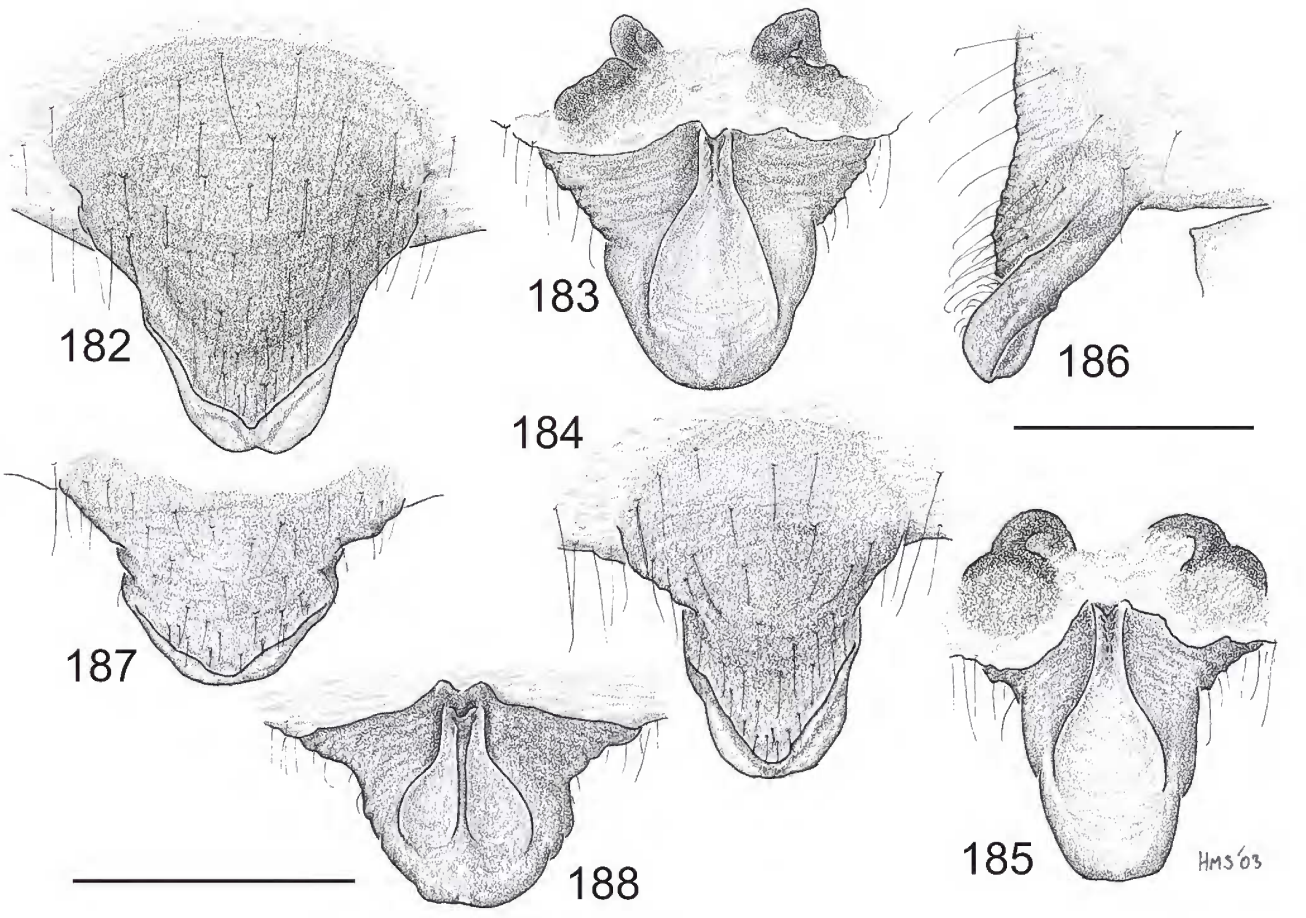
As with other *Poltys* species, all morphological features are quite variable in shape and colouration, especially the abdomen. Some examples (taken from different species but representative of all within the group) are shown in Figs 5–8, 165–170 and 176–181. Male abdomens show only slight variation, some being more rounded (Fig. 199) and others tending towards taller and narrower (example from *P. noblei*, Fig. 202). There is considerable variation in male carapace shape and relative eye sizes (as illustrated in *P. grayi*, Figs 203–206). The protrusions dorsal to the PME (Figs 200–201) are variable but usually prominent in *P. laciniosus*.



Figs 171–181. *Poltys laciniosus*-group females. 171–173, carapace and coxae, dorsal: 171, *P. laciniosus* (holotype), 172, *P. grayi*, 173, *P. noblei*. 174–175, eye region, lateral, of specimens shown in 171–172. 176–181, abdomens of holotypes, dorsal and lateral: 176–177, *P. laciniosus*; 178–179, *P. grayi* (right humeral tubercle damaged); 180–181, *P. noblei*. Scale lines: lower right, 3 mm for Figs 176–181; upper right, 2 mm for Figs 171–172, 1 mm for Figs 174–175; left, 2 mm for Fig. 173.

Biology. *Poltys laciniosus* construct a fine orb web between dead twigs at night (Fig. 10), which is typically about 25cm in diameter for an adult female; the hub may be left entire or bitten out to varying degrees. The web is taken down towards dawn and the spiders mimic part of a dead twig during the day. Egg sacs are grey/brown silk with a sparse overlay of white, sometimes finished off with a light bobble of silk. These are made along the underside of a twig, commonly where there is some other bump or a fork to disguise the shape (2 egg sacs are on the left of Fig. 10—arrowed). Females of this species and *P. noblei* have been collected together from mud wasp nests in southeastern Queensland (S42608–09), but *P. laciniosus* mostly seems to occur in less humid areas.

Distribution. Probably present over much of mainland Australia where tree or scrub cover is reasonably extensive. Away from centres of population, the distribution shown



Figs 182–188. *Poltys laciniosus* epigynes. 182–185, normal range of variation, anterior then posterior view. 186, lateral (182, 186, holotype). 187–188, *P. laciniosus*? ex Kimberley region. Scale lines = 0.5 mm, lower left for Figs 187–188 only.

(Fig. 217) mostly represents collecting trips made by museum arachnologists. Not recorded on trips through the drier interior of Australia (Broken Hill, Coober Pedy, Uluru etc.) and uncommon on the east coast where *P. noblei* is dominant.

Poltys grayi n.sp.

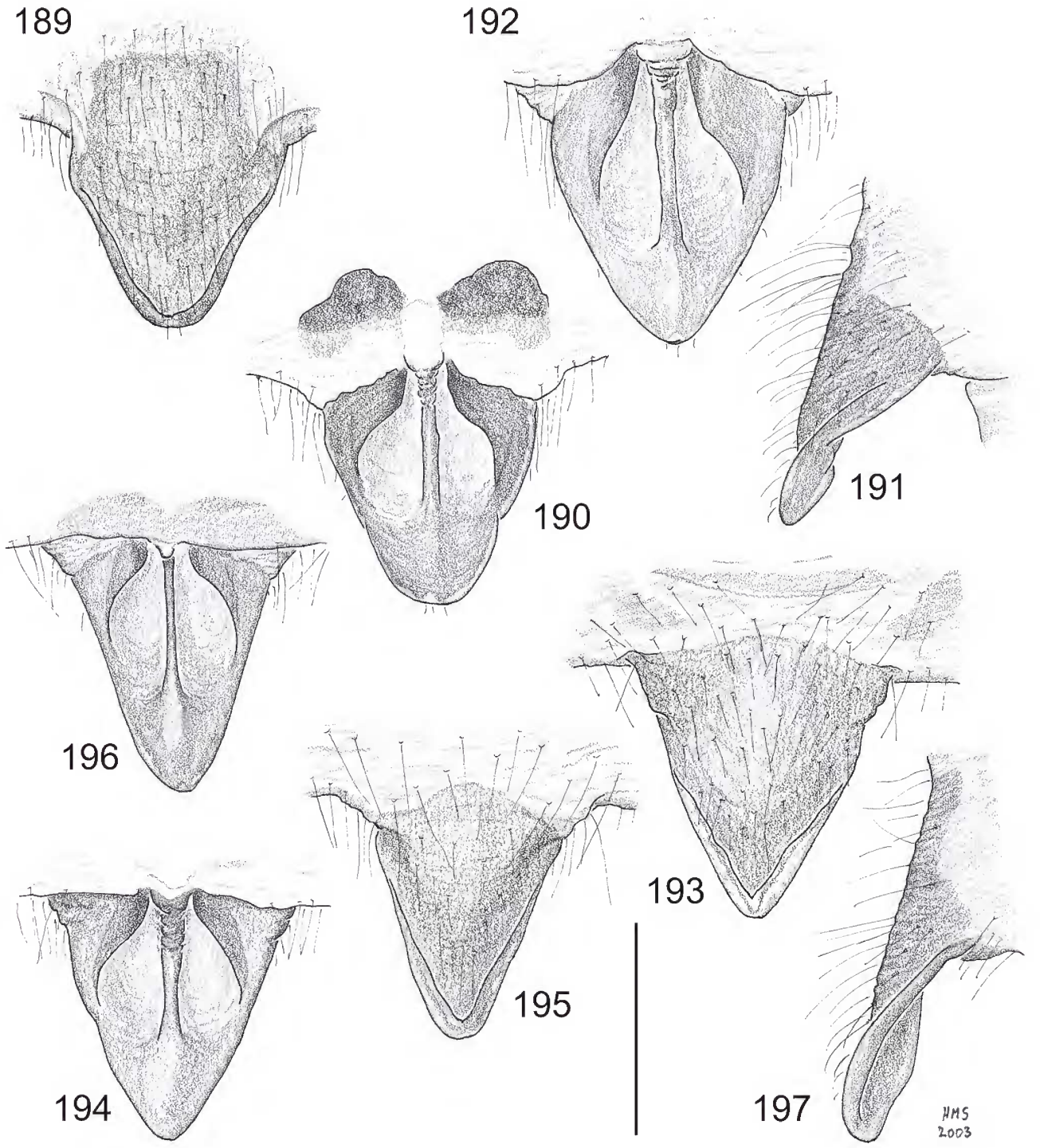
Figs 5–6, 15, 164, 167–168, 172, 175, 178–179, 189–192, 203–207, 211–213, 217, 222.

Etymology. This species is named in honour of Dr Mike Gray, who first collected this species.

Type material. AUSTRALIA: NEW SOUTH WALES: LORD HOWE ISLAND: HOLOTYPE ♀ KS71139, between War Memorial and Lord Howe Island Board, 31°31'53"S 159°04'02"E, 15 Dec. 2000, HMS, in web feeding on one moth, second wrapped at side of web, night. PARATYPES ♂ KS71127, track to start of Gower Walk, 31°33'54"S 159°04'29"E, 10 Dec. 2000, HMS, night coll.; ♂ KS71130, jnct of tracks on Smoking Tree Ridge, 31°33'20"S 159°05'09"E, 3 Dec. 2000, HMS & C. Reid, beating dead twigs; ♀ KS70616, track to start of Mt Gower walk, S end Salmon Beach, 31°33'50"S 159°04'30"E, 1 Mar. 2001, G. Milledge, night coll.; ♂♀ KS70351, Middle Beach Rd–Anderson Rd track, 31°31'36"S 159°04'08"E, 8 Dec. 2000, HMS, ♂ on edge of ♀ web, night coll; ♂♀ KS70352, start of Transit Hill track opp. Board yard, 31°31'48"S 159°04'05"E, 6 Dec. 2000, HMS, at night, courting.

Other material. AUSTRALIA: NEW SOUTH WALES: LORD HOWE ISLAND: ♂ KS71140, ♀♀ KS71136, KS71138, KS70347, Bowker Ave, 31°31'47"S 159°04'08"E, 9 & 14 Dec. 2000; ♀ KS70344, Capella South, 31°33'13"S 159°04'50"E, 11 Dec. 2000; ♂ KS71132, Gower–Lidgbird Ridge, 31°34'49"S 159°04'58"E, 12 Dec. 2000; ♂ KS71134, ♀ KS90967, start of Gower walk, 31°33'54"S 159°04'29"E, 10 Dec. 2000; ♀♀ KS71137, KS70340, KS70343, KS90953, KS90955, KS90968, sites along Lagoon Rd, 31°31'S 159°04'E, 6–15 Dec. 2000 (KS90968 and KS90953 laid eggsacs "A" and "B" in Smith 2003, respectively); ♂ KS71131, opposite LHI Board office, 31°31'49"S 159°04'05"E, 4 Dec. 2000; ♂♂ KS71126, KS71133, Max Nichols Memorial Boardwalk, 31°31'3"S 159°03'35"E, 11 Dec. 2000; ♂♀ KS70350, Middle Beach Rd, 31°31'40"S 159°04'07"E, 24 Nov. 2000; ♀ KS70341, Middle Beach Rd–Anderson Rd track, 31°31'36"S 159°04'08"E, 8 Dec. 2000; ♀ KS90954, Palm Nursery, 31°31'S 159°03'E, Feb. 2001; ♂ KS33924, trail on N face of North Hummock, 31°32'48"S 159°04'54"E, 6 Feb. 1971; ♀♀ KS70348 (2), KS71135, Research Centre, 31°31'37"S 159°03'58"E, 24 Nov. 2000; ♀ KS70342, ♂ KS71129, Smoking Tree Ridge, 31°33'17"S 159°05'09"E, 3 & 10 Dec. 2000; ♀♀ KS70346, KS70349, KS70345, Steven's Reserve, 31°31'34"S 159°03'49"E, 5 & 15 Dec. 2000; ♂♂ KS71128, KS71141, Transit Hill, 31°32'09"S 159°04'43"E, 8 Dec. 2000; ♀ KS71142, Windy Point, 31°32'05"S 159°04'08"E, 14 Dec. 2000.

Diagnosis. Use *P. laciniosus*-group diagnosis to separate specimens from other species groups. **Females**. From *P. laciniosus* by long V-shaped epigyne with distinctly separate foveae (Fig. 190), and pale carapace without projections above PME (Figs 172, 175). From *P. noblei* by epigyne margins parallel at base before converging and tip usually more rounded (Figs 190, 192). **Males**. Conductor not as strongly twisted as *P. laciniosus* (Fig. 212); embolus shorter than *P. laciniosus* but terminal flange absent or small cf. *P. noblei* (Figs 212, 222).



Figs 189–197. *Poltys laciniosus*-group epigynes. 189–192, *P. grayi*: 189–191, holotype: anterior, posterior and lateral; 192, variant, posterior. 193–197, *P. noblei*: 193–194, broad example, anterior and posterior; 195–197, narrow example, anterior, posterior and lateral. Scale line = 0.5 mm.

Description. **Female**. Carapace length range 3.27–4.29. *Drawn specimens* Figures: 164, 172, 175, KS70346; 167–168, KS71138; 178–179, 189–191, KS71139 (holotype). 192, KS70341. General characters see *P. laciniosus*.

Holotype. *Prosoma*. Carapace: length, 3.92, width 3.06, height 1.14; relatively wide but tall; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated (Figs 172, 175). Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.45, width 0.75. Sternum: length 1.71, width 1.63; well formed sternal extensions at bases of legs III–IV, also a slight point at II. • *Eyes*. (Fig. 175). PME≥AME>ALE=PLE; ALE c. 0.3× its own diameter from AME; ventral margin of ALE is just ventral of mid point of AME. • *Legs*. (Fig. 164). P+TL I: 5.67, II: 5.42, III: 3.25, IV: 4.08; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or

½ way leg II. • *Abdomen*. (Figs 5, 178–179). Length 7.58 (not including humeral tubercles), width 7.08; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne*. Tongue-like, widest point at base, sides more or less parallel before converging to a bluntly rounded tip (Fig. 189); distal median bulge variable, but usually distinct (Fig. 191); foveae separated by a strong median ridge, foveae broader basally than *P. noblei* (usually visible through lateral plates) in posterior view (Figs 190, 192); lateral plates curve ventrally either side of basal median plate, forming tubes into the copulatory ducts; ducts pass anteromedially between spermathecae then turn outwards to enter dorsomedially; ducts broadly separated along whole width; spermathecae separated by about 1.5× a spermatheca width. • *Colour in alcohol*. Carapace pale creamy-yellow, caput fuscous laterally and with darker patches anteriorly, yellow patch on dorsal caput and eye tubercle, dark brown around main eyes. Chelicerae brown, orange on cheliceral boss and distal inner faces. Labium, maxillae and sternum orange-tan. Pedipalps creamy-yellow, sparsely mottled with brown. Femora I and II pale basally then with two brown bands almost surrounding yellow band (Fig. 164); femur III pale mottled to darker distally; femur IV dark to paler in distal third; distal legs mottled with yellow and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally dark grey around pedicel and posteriorly to spinnerets except paler book lung covers, laterally and anteriorly with band of cream; dorsally overall white, with black and grey markings.

Male. Carapace length range 0.90–1.22. *Drawn specimens* Figures: 203–204, 207, KS71134; 205–206, KS71140. 211–213, KS71127. General characters see *P. laciniosus*.

Male KS71127. *Prosoma*. (Figs 205–206). Carapace: length 1.00, width 0.78, height 0.37; eye tubercle well defined with distinct dip between caput and eye tubercle in lateral view. Labium: length 0.11, width 0.19. Sternum: length 0.45, width 0.46. • *Eyes*. (Figs 205). AME>PME> PLE>ALE; ALE almost touching AME; height of ventral margin of ALE is at mid point of AME. • *Legs*. P+TL I: 1.22, II: 1.12, III: 0.61, IV: 0.78. • *Abdomen*. Length 1.31, width 0.88; a tall ellipsoid, rounded apex, widest at mid-height; main two pairs of apodemes well developed for a male. • *Palpal organ*. (Figs 211–213, 222). Radix–stipes joint retrobasal, obscures margin of retrobasal subtegulum, sclerites not hidden by cymbium (Figs 212, 213); no TA; distal embolus wire-like, grooved and curving towards tip of MA, ending in a small barb (Figs 212, 222); PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized; conductor thumb-like, with only slight angle towards prolateral (Figs 211–212). • *Colour in alcohol*. Lateral carapace light olive, caput darker, both with black median markings and fuscous margin; eye tubercle orange; dark brown round AME. Chelicerae, labium and maxillae olive: chelicerae, paler basally and distally. Sternum yellow-brown with fuscous edges. Femora fuscous olive-black, pale basally; femur III with darker partial banding; patella to upper metatarsus of all legs dark orange-olive dorsally, darker or blackened ventrally, dark banding on distal metatarsi and tarsi. Palpal cymbium and tibia dark olive, cymbium black distally, patella and femur creamy-white marked with black. Abdominal book lung covers pale, darker towards spinnerets; surrounding ventral areas black with orange maculation in area anterior to pedicel; dorsum with vague olive–brown and black pattern on a lighter ground.

Remarks. The only previous records of a *Poltys* species from Lord Howe Island were by Rainbow (1920) who described *Poltys penicillatus* and Gray (1974) who collected a male and ascribed it to Rainbow's species. Rainbow's description was based on a female specimen collected by A.M. Lea on an expedition to Lord Howe and Norfolk Islands. This specimen actually represents *P. illepidus*, which is recorded from Norfolk Island, but has not since been found on Lord Howe. Gray's male specimen is the first record of the new species described here.

Variation. Whilst some female specimens of *P. grayi* are similarly coloured to typical *P. noblei*, many are almost totally lacking carapace pigmentation and also have extremely pale abdominal camouflage and reduced dark areas on legs (Fig. 164). The variation in somatic characters is similar to other species in the group. The epigyne varies in shape, especially the acuteness of the point (Figs 190, 192). The flange on the tip of the male embolus is also variable and in some specimens is large enough to reflect light in the same way as *P. noblei*.

Biology. The biology of *P. grayi* is similar to that of *P. laciniosus* and *P. noblei*, the spider making a fine web at night and mimicking part of a dead twig during the day (Figs 5 (holotype), 6). Egg sacs are of white silk with an overlay of brown, usually finished off with a dark brown bobble of silk (Fig. 15), and are laid along the underside of a twig as in *P. laciniosus*.

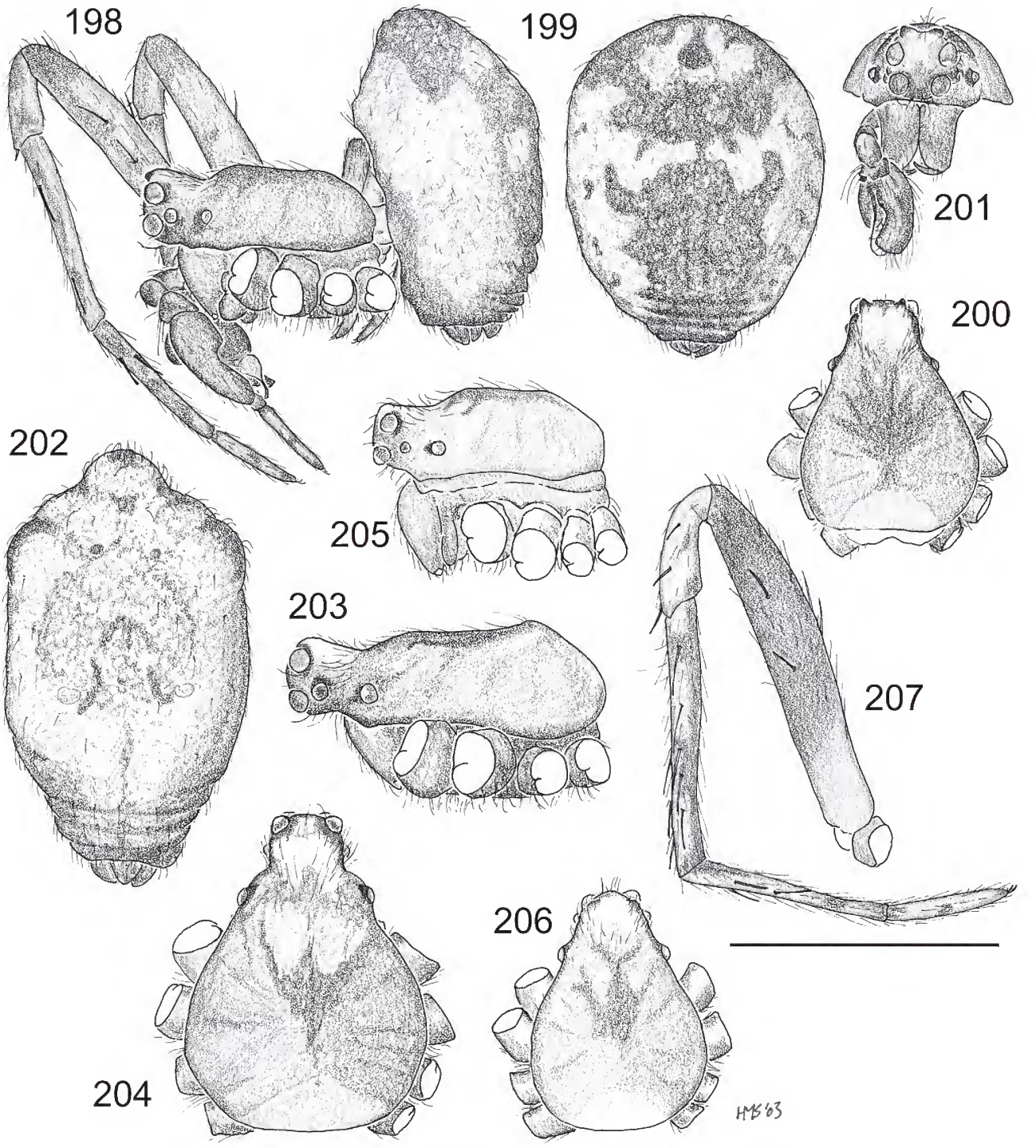
Distribution. Only recorded from Lord Howe Island in the Tasman Sea (Fig. 217).

Poltys noblei n.sp.

Figs 7–8, 165–166, 173, 180–181, 193–197, 202, 214–217, 220–221.

Etymology. This species is named in honour of John Noble, who has collected many specimens for the Australian Museum collections, including *Poltys*.

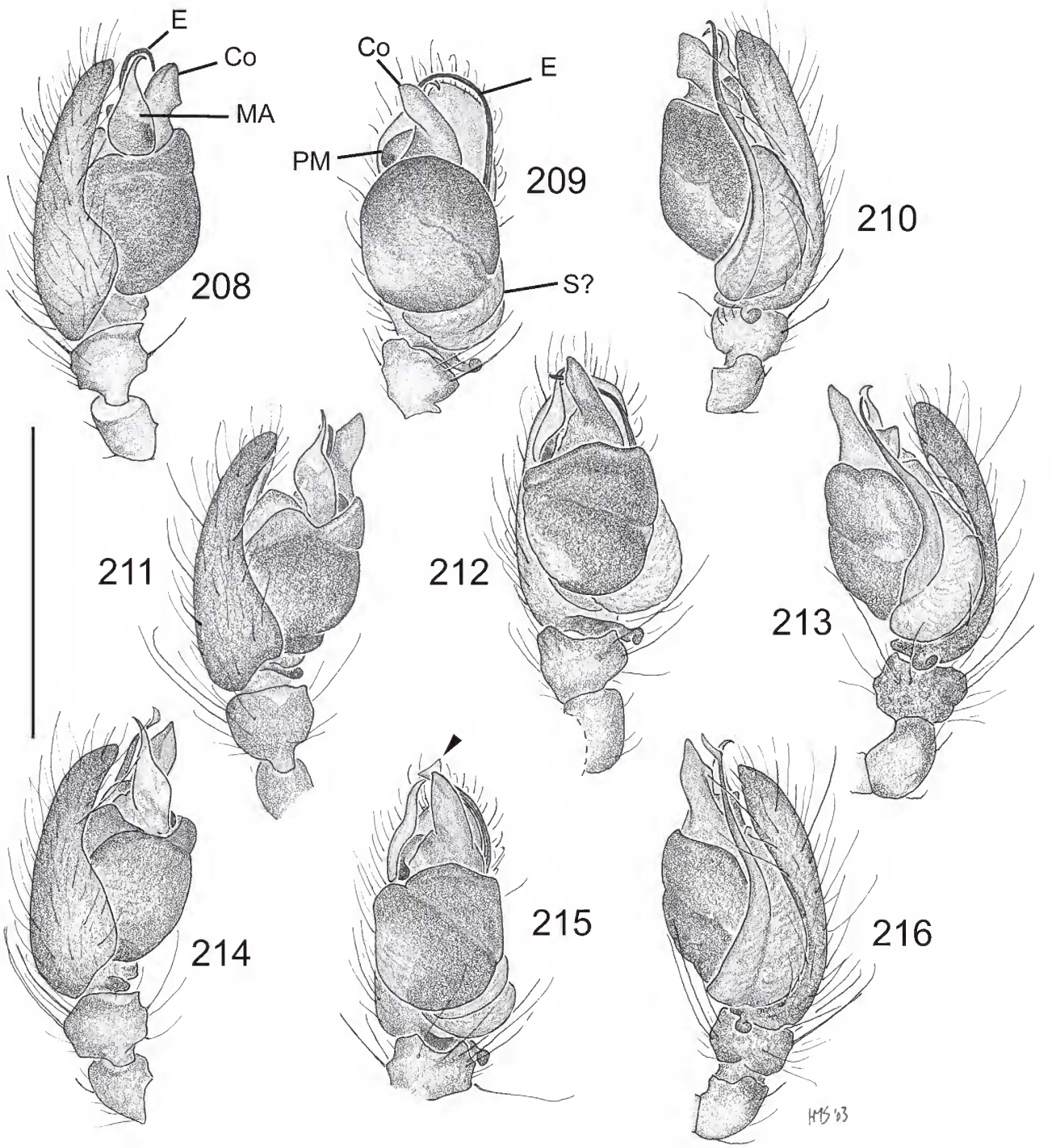
Type material. AUSTRALIA: NEW SOUTH WALES: HOLOTYPE ♀ KS34412, Beecroft, Sydney, 33°45'S 151°04'E, 3 Aug. 1992, J. Noble. PARATYPES ♂ KS52216, Beecroft, Sydney, 33°45'S 151°04'E, Mar. 1998, J. Noble, matured late May 1998; ♀ (and non-type juveniles) KS33957, ♂ (and non-type juveniles) KS72255, Broken Bay, 33°34'S 151°19'E, 10 Apr. 1966, Mascord Collection; ♂ KS55718, King's H'way, 12 km W Batemans Bay, 700 m N along rd to Shallow Crossing, Tourist drive 3, 35°37'S 150°08'E, 30 Mar. 1999, HMS, beating dead *Acacia decurrens*?, as juvenile, matured 28 Apr. 1999; ♂ KS54368, Ku-ring-gai Chase NP, Powerline Track, 33°40'21"S 151°08'09"E, 4 Jan. 1999, MRG & HMS, hanging on silk line from dead twig; ♀ KS55708, as KS54368, 29 Dec. 1998, MRG, at night in webs on living prickly *Hakea*; ♂ NMV K-8895, Long Beach Rd, 1.4 km off Princes H'way on sidetrack to NE, 35°41'S 150°14'E, 30 Mar. 1999, HMS, beating dead *Acacia decurrens*?, as juvenile, matured 28 Apr. 99; ♀ KS55685, Mystery Bay, Council bushland near beach, 36°18'S 150°07'E, 12 Jan. 1999, HMS, at night in dead twigs, laid eggsac, 15 Jan. 99; ♀ KS53844, Royal National Park, Lady Carrington Drive, 34°08'50"S 151°01'45"E, 15 Oct. 1998, HMS, twigs at night; ♂ KS70368, Royal National Park, Sir Bertram Stevens Drive, c. 0.3 km E Artillery Hill, 34°04'59"S 151°03'20"E, 20 Dec. 1999, HMS, ex dead twigs, beating. QUEENSLAND: ♂ KS58062, Forty Mile Scrub NP, 18°07'56"S 144°48'40"E, 12 May 2000, M&S, beating; ♀ (and non-type juvenile) KS313, Mt Dryander (lower slopes) N of Proserpine, 20°15'S 148°32'E, Apr. 1975, MRG & C. Horseman, 120 m; ♀ S42496, Fig Tree Pocket, Roedean St, 27°31'S 152°57'E, 14



Figs 198–207. *Poltys laciniosus*-group males. 198–201, *P. laciniosus*: 198, general lateral view; 199, abdomen, dorsal (rounded variant); 200, carapace and coxae, dorsal; 201, frontal carapace, right palpal organ and chelicerae. 202–207, extent of variation throughout species group: 202, abdomen dorsal, elongate variant (*P. noblei*); 203–204, 207, large specimen: 203, prosoma lateral; 204, dorsal; 207, spination prolateral leg I; 205–206, small specimen: 205, prosoma lateral; 206, dorsal (203–207 all *P. grayi*). Scale line = 1.0 mm.

Dec. 1974, V.E. Davies; ♂ S42547, Upper Brookfield, SEQ, 27°28'S 152°51'E, 17 Jun. 1981, V.E. Davies, R.J. Raven. VICTORIA: ♀ NMV K-8896, Ninety Mile Beach, half way between Seaspray and Paradise Beach, 38°20'S 147°20'E, 10 Jan. 1999, HMS, in web at night on dead *Banksia*.

Selected other material examined. AUSTRALIA: NEW SOUTH WALES: ♂ KS55714, Ashfield, 33°53'S 151°08'E, 4 Feb. 1999; ♀ KS33920, Avalon, 33°38'S 151°20'E, 8 Dec. 1957; ♂ KS72254, ♀ KS78144, Beecroft, Sydney, 33°45'S 151°04'E, 8 Apr. 2001 & 14 Apr. 2002; ♀ KS56886, Bodalla SF, 1.5 km S of Bodalla on Princes H'way, 36°06'50"S 150°03'28"E, 18 Feb. 1999; ♀ KS10162, Bonny Hills, 31°36'S 152°51'E, 9 Dec. 1981; ♂ KS70369, Cordeaux Dam Rd, 34°18'S 150°49'E, 26 Oct. 2000; ♀ KS56887, Dampier SF, 36°07'S 149°57'E, 19 Feb. 1999; ♂ KS57786, Heathcote NP, jnct Woronora Dam Rd and Old Prince's Hwy, 34°09'30"S 150°58'10"E, 8 Dec. 1999; ♂ ♀ KS52215, Mt Warning camp site, Wallaby Track, 28°24'S 153°16'E, 17 May 1998; ♂ KS56885, Murramarang NP, North Head Rd, 35°41'52"S 150°16'37"E, 17 Mar. 1999; ♀ KS69653, Nadgee hut area, 37°22'S 149°55'E, 1973. QUEENSLAND: ♂ KS86249, ♀ KS86250, SW of Malanda, Merragallan



Figs 208–216. *Poltys laciniosus*-group male palps. 208–210, *P. laciniosus*: prolateral, ventral, retrolateral; 211–213, same for *P. grayi*; 214–216, same for *P. noblei*. Scale line = 0.5 mm.

Rd, 17°25'08"S 145°32'37"E, 22 Sep. 2003; ♀ S42552, Black Mountain, NEQ, 1972; ♀ S42494, Brisbane, 27°28'S 153°01'E, 10 Apr. 1974; ♀♀ S42609 (3), Camira, 27°38'S 152°55'E, 7 Dec. 1985; ♀ S42553, Cooloola, 25°27'S 153°05'E, 7 Nov. 1976; ♀ S42497, Closeburn, 27°20'S 152°52'E, 20 Dec. 1970; ♀ S42597, Double Is Pt, 25°55'S 153°11'E, 4 Aug. 1985; ♀ S42499, Godwins Beach, Deception Bay, 27°11'S 153°01'E, 19 Jan. 1979; ♀ S42592, Mailaybrook, 26°51'S 151°34'E, 7 Mar. 1976; ♀ S42495, Mt Cootha, 27°29'S 152°57'E, 1 Jan. 1974; ♀ S55610, N Stradbroke Island Enterprise, 27°37'S 153°26'E, 10 Jan. 2002; ♀ W165 (QM), Red Hill, Gympie, 26°11'S 152°39'E, 4 Jun. 1925.

Diagnosis. Use *P. laciniosus* diagnosis to separate from other species groups. **Females**. From *P. laciniosus* by long V-shaped epigyne with distinctly separate foveae (Figs 193–196), and rather paler carapace. From *P. grayi* by epigyne margins that converge from base in almost straight line, tip often acutely pointed (Figs 194, 195). **Males**. Embolus with large terminal flange (difficult to see directly, but reflects light strongly) (Figs 215, 220), conductor almost straight (Fig. 215).

Description. **Female**. Carapace length range 2.78–4.45. *Drawn specimens* Figures: 165–166, S42495; 173, KS78144; 180–181, KS34412 (holotype); 193–194, KS55685; 195–197, KS313. General characters see *P. laciniosus*.

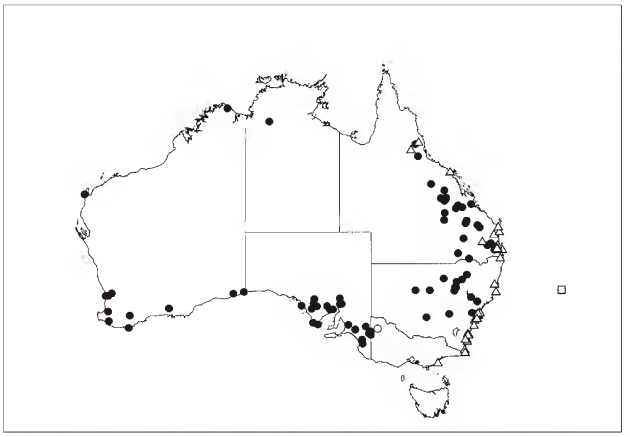


Fig. 217. Distribution of *Poltys laciniosus*-group species: *Poltys laciniosus* (adult records, ●; juvenile, ○); *Poltys grayi* (□); *Poltys noblei* (△).

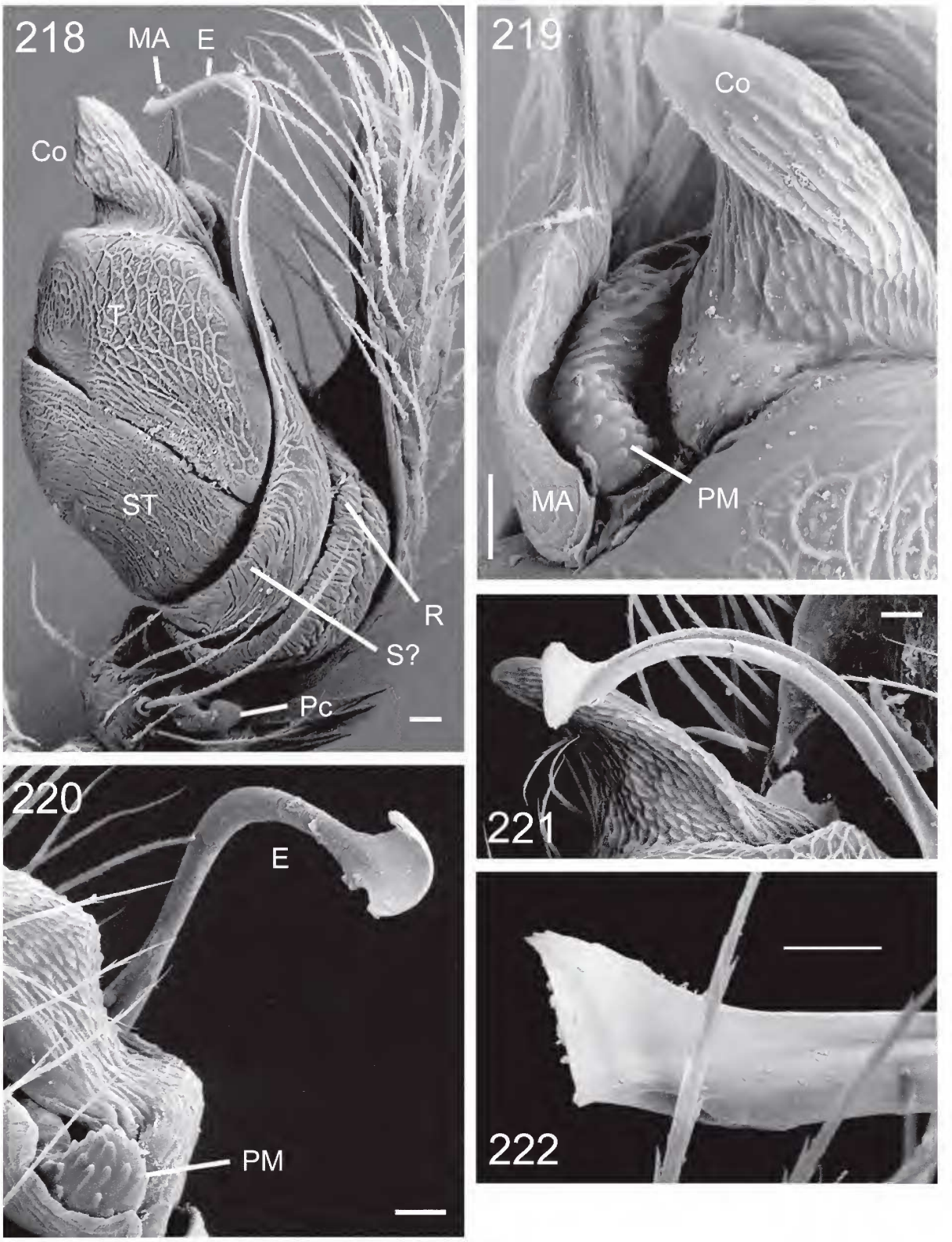
Holotype. *Prosoma.* Carapace (Fig. 173), length, 3.67, width 2.94, height 1.14; relatively wide but tall; eye tubercle well developed, slender basally, slightly enlarged anteriorly, slightly elevated; dorsal protrusions above PME moderately well developed. Chelicerae: paturon with 3 promarginal teeth. Labium: length 0.41, width 0.71. Sternum: length 1.63, width 1.55; sternal extensions at bases of legs II–IV. • *Eyes.* AME≥PME>PLE>ALE; ALE c. 0.3× its own diameter from AME; ventral margin of ALE is just ventral to mid point of AME. • *Legs.* P+TL I: 5.75, II: 5.42, III: 3.17, IV: 4.08; front femora distinctly broadened with greatest diameter c. ⅗ way to apex leg I, or ½ way leg II. • *Abdomen.* (Figs 180–181). Length 8.33, width 4.75; broadest at humeral tubercles; some "microsigillae" visible but not strongly developed. • *Epigyne.* A triangular plate, widest point at base, sides converge from base to a more or less pointed tip (Figs 193, 195); with a prominent distal bulge in lateral view (Fig. 197; basally epigyne often deeper than shown); foveae narrower than those of *P. grayi* basally, separated by a strong median ridge of variable height (Figs 194, 196); lateral plates curve either side of basal median plate, forming tubes into the copulatory ducts; ducts of holotype not examined but usually pass anteromedially between spermathecae then turn outwards to enter basomedially; ducts separate, but closer together than *P. grayi* until they turn laterally; spermathecae separated by about two spermatheca widths. • *Colour in alcohol.* Carapace amber, caput darker, with yet darker patches anteriorly; yellow patch on dorsal caput deepens to orange on eye tubercle; protrusions dorsal to PME tipped brown; dark brown ventral to main eyes. Chelicerae brown, orange on cheliceral boss and distally. Labium, and maxillae orange-tan. Sternum brown. Pedipalps yellow, sparsely mottled with brown. Femur I mostly dark brown from base except for yellow band; femur II colouration less distinct; femur III pale, distally dark retrolaterally; femur IV dark to paler in distal third; distal legs mottled with yellow and brown, distinct dark bands on distal metatarsi and tarsi of I and II. Abdomen ventrally black around pedicel and posteriorly to spinnerets except paler book lung covers, and a rectangular patch anterior to pedicel, laterally and anteriorly creamy-white; dorsally with a cream point and extending down the median line (like the centre of a broken twig), surrounded by black and grey markings on a greyish background.

Male. Carapace length range 0.84–1.20. *Drawn specimens* Figures: 202, KS72254; 214–216, KS52216. General characters see *P. laciniosus.*

Male KS52216. *Prosoma.* Carapace: length 1.12, width 0.80, height 0.41; eye tubercle well defined with distinct "v" between caput and eye tubercle in lateral view; with well-developed dorsal protrusions above PME. Labium: length 0.10, width 0.20. Sternum: length 0.50, width 0.48. • *Eyes.* AME=PME>ALE=PLE; ALE about ⅙ its own diameter from AME; height of ventral margin of ALE is at mid point of AME. • *Legs.* P+TL I: 1.57, II: 1.25, III: 0.69, IV: 0.90. • *Abdomen.* (Fig. 202). Length 1.57, width 0.96; a tall ellipsoid, slightly pointed at apex and with slight humeral bumps; widest at humeral bumps. • *Palpal organ.* (Figs 214–216, 220–221). Radix–stipes joint almost basal, stipes wraps margin of retrobasal subtegulum, not hidden by cymbium (Figs 215–216); no TA; distal embolus wire-like but thicker than *P. laciniosus*, grooved and gently arcing towards tip of MA, flaring into a curved apical flange at tip (arrowed in Fig. 215, Figs 220–221); conductor thumb-like, almost straight; PM a sculptured curving structure looking like a clenched fist, extending ventrally almost to edge of tegulum, heavily sclerotized (Figs 215, 220). • *Colour in alcohol.* Lateral carapace pale olive, caput darker olive, both with black median markings and fuscous margin; eye tubercle orange, with brown points to protrusions dorsal to PME; dark brown round AME. Chelicerae, labium, maxillae and sternum olive: chelicerae, paler basally and distally, sternum with fuscous edges. Femora pale olive, darkening distally; femur I with pale yellow band as seen on females; femur III with darker partial banding; patella to upper metatarsus of all legs pale olive dorsally, blackened ventrally, dark banding on distal metatarsi and tarsi. Palpal cymbium olive-brown with darker patches; tibia fuscous, patella fuscous dorsally, femur and ventral patella mostly creamy-white. Abdominal book lung covers and posterior to epigastric fold pale, two white patches anterior to spinnerets; surrounding ventral areas black changing to brown apically; dorsum with vague olive–brown and black pattern on a white ground.

Variation. As in *P. laciniosus*, a wide range of female abdominal shapes has been recorded for *P. noblei* (see Smith, 2003). The variation in the analysed section of COI, however, was found to be small over the entire N–S range of the species and apparently is not related to abdominal shape. The development of the dorsal protrusions above the PME is variable but usually less pronounced than in *P. laciniosus*. Some epigynes approach a shape more typical of *P. grayi*, but the foveae still narrow more sharply into the copulatory ducts (often visible through the lateral plates in posterior view).

Biology. Like *P. laciniosus*, these spiders build a fine web at night and mimic part of a dead twig during the day (Figs 7–8). In an adult female web, the sticky spiral area measures up to approximately 25 cm in diameter; and is often taller than wide due to increasing spiral spacing, especially in the upper section. Egg sacs are of fawn to grey silk with an overlay of brown, and are usually finished off with a dark brown silk bobble, and are laid along the underside of a twig as in *P. laciniosus*. Moths are the main prey caught except possibly by spiderlings, but many other types of non-dangerous prey are also taken, e.g., lacewings (Neuroptera) and termites. Several southeastern Queensland records are of specimens found in mud wasp nests (some identified as



Figs 218–222. *Poltys laciniosus*-group male palpal characters. 218–219, *P. laciniosus*: 218, bulbus, retrolateral; 219, detail of terminal bulbus, ventral. 220–221: *P. noblei*, embolus and terminal flange, prolateral and ventral views. 222, *P. grayi*, embolus tip, ventral. Scale lines = 20 µm.

belonging to *Sceliphron laetum*). In two specimen lots from a locality in southeastern Queensland, there were specimens of both *P. noblei* and *P. laciniosus*, presumably taken from the same wasp nest. This species appears to prefer more humid areas than *P. laciniosus*.

Distribution. Locally abundant along the East coast of Australia, from southern Victoria northwards (Fig. 217). In far northern Queensland, it is displaced to moist habitats at higher altitude (and *P. frenchi* takes its place in lowland rainforest areas).

Australasian species currently considered *nomina dubia*

Poltys moluccum (Doleschall, 1859:45, fig. 1). Indonesia: Amboina. The type specimen could not be found in unsorted material in RMNH, the most likely repository. This species was synonymized with *P. illepidus* by Simon (1885) but the illustration and mention of an elongate web suggest it is not that species. If the type is found the name may prove to be a senior synonym of *P. frenchi*, but the fauna of this area is insufficiently known to assert this with any certainty at present.

Poltys dromedarius (Bradley, 1876b:249, fig. 2). New Guinea: Hall Sound (Chevert Expedition). Most Chevert Expedition material is in the MMUS, but the type could not be located there.

Poltys papuensis (Bradley, 1876a:223, fig. 2). New Guinea: Hall Sound (Chevert Expedition). As above, this type should be in the MMUS, but could not be located there. Bradley's figure of this species shows an elongate epigyne, so if found this type could prove to be a senior synonym of *P. frenchi*. The *Poltys* fauna of New Guinea, however, is insufficiently known at present.

Notes on southeast Asian *Poltys* species

In addition to the species discussed under the *P. illepidus* and *P. columnaris*-group headings above, the *Poltys* fauna of SE Asia contains at least two species, or species groups, which are not represented in the Australian fauna.

One of these contains three described species, *P. mouhoti, P. idae* and *P. longitergus* Hogg, the females of which have extremely elongate, curled and club-tipped abdomens. These types were not examined in detail to avoid unnecessary handling as the abdomens are easily damaged. Two non-type specimens from India (BMNH) and Malaysia (JK coll.) were examined, however, and one of these is figured here (Figs. 244–246). Various unmatched males have been examined, but none stands out as being likely to belong to this group.

The other *Poltys* taxon that is not represented in Australia is currently only recorded from Sumatra and Singapore. The outstanding feature of *P. elevatus* is a dense brush of setae on retrolateral femur IV, with flattened setae proximally (Fig. 243). This setal patch appears to meet with long setae on the lateral flanks of the abdomen adjacent to the book lung covers. Together they may form a stridulatory organ. I have not seen any other signs of similar modification in other *Poltys* species, but a similar character is found in *Caerostris* (Grasshoff, 1984).

All the described species of *Poltys* from the SE Asian region with a known overlap with the Australian fauna are listed in Appendix 1. Some basic illustrations of epigynes and other possibly diagnostic features are also shown in Figs 223–247. All figures except 243 and 244–246 are of type specimens.

Separation of Australian species using molecular characters

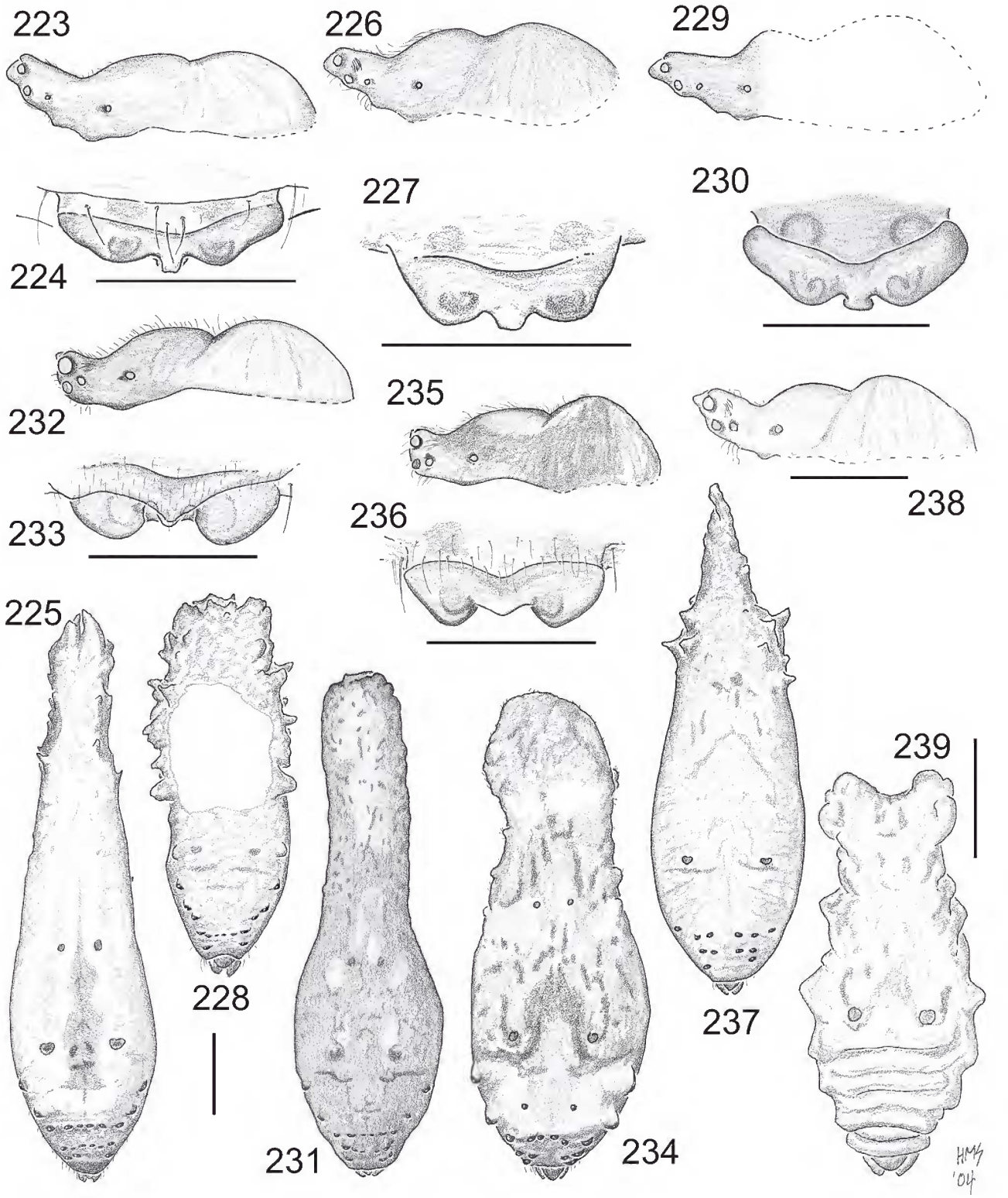
Background. There are at least five situations where it has been demonstrated that morphological attributes alone may not provide adequate information for species identification (Baverstock & Moritz, 1996). Four of these appear to be relevant to one or more species or species-groups within the Australian *Poltys* fauna:

1 Two sympatric or parapatric species may be so similar in morphology that specific status is not detected (*Poltys noblei* cf. *P. laciniosus*).
2 Two allopatric populations may be morphologically different but it is unclear whether they are biologically distinct. (*Poltys grayi* cf. *P. noblei*; *P. laciniosus* ex the NT/Kimberley region).
3 Two parapatric populations may be morphologically distinct but show clinal variation. (Epigynal size and shape in *P. laciniosus*; modified patellar spines in *P. illepidus*).
4 Two (or more) morphologically distinct forms may represent polymorphisms within a single interbreeding population. (Any of the species with distinct variations of abdominal shape; investigated specifically in *P. noblei*).

The variability of mitochondrial DNA (mtDNA) sequences has made certain areas of this genome a target for phylogeographic, population and interspecific analyses. There has been some discussion on the suitability of non-recombining loci for species separation in the phylogenetic sense (e.g., Davis & Nixon, 1992; Moritz *et al.*, 1992); nonetheless mtDNA has been demonstrated to be a useful tool to aid or confirm species recognition in a number of invertebrate studies such as Hedin (1997b, araneoid spiders), Trewick (2000, onychophorans) and Pawson *et al.* (2003, carabid beetles).

Recently broad success has been claimed in using COI sequences as "species barcodes" (Hebert *et al.*, 2002, 2003, 2004). In particular, Hebert *et al.* (2003) demonstrated that more than 98% of congeneric species pairs of animals showed more than 2% divergence (uncorrected pairwise comparisons), and that for chelicerates (1249 pairs of taxa examined) the mean interspecific divergence was 14.4%. In contrast, intraspecific divergences for the varied taxa used as examples by Avise (2000) were reported to be rarely greater than 2% and often less than 1% [interpreted by Hebert *et al.* (2003): the original studies have not been checked here]. These figures make a useful baseline for the use of mtDNA in confirming, or guiding, problematic species separations in *Poltys* when considered with information from a nuclear gene (ITS2) and morphological studies.

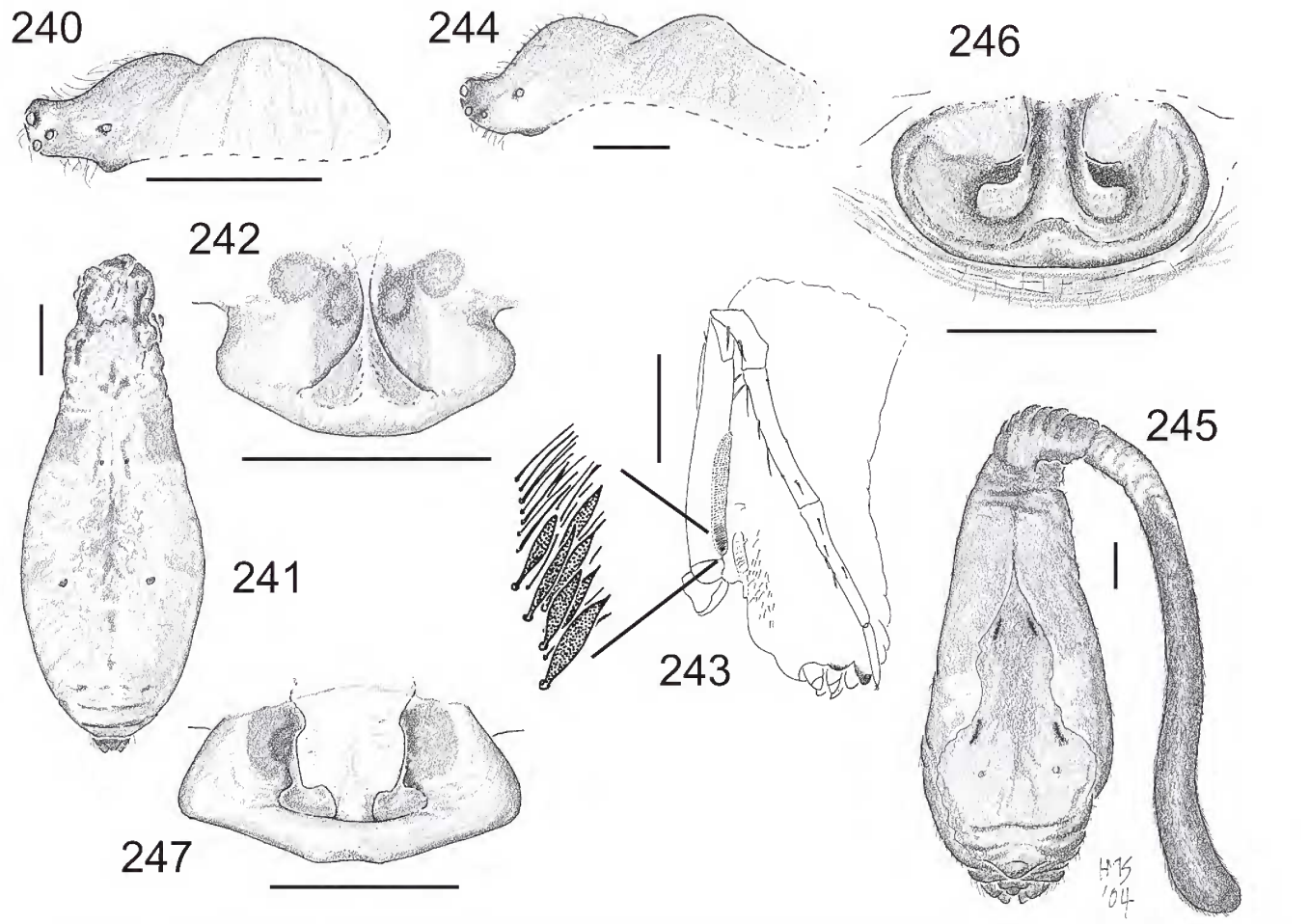
Methods. A 212 base pair section of the mitochondrial gene, cytochrome c oxidase subunit I (COI) and the entire length of the nuclear ribosomal internal transcribed spacer 2 (ITS2) along with its immediately flanking 28S and 5.8S coding regions, were sequenced (ranging from 394–403 base pairs in total). DNA sequencing methods and the primers for the COI sequence were given in Smith (2003). The ITS2 protocol and primers were based on information given in Hedin (1997a). Sequences were edited and assembled using Sequencher® 4.1. Sequences were aligned using Se-Al v.2.0 (Rambaut, 1996) and ClustalX (Thompson *et al.*, 1997), edited manually if required (see below for details of ITS2



Figs 223–239. SE Asian *Poltys columnaris*-group type specimens: carapace lateral, epigyne anterior (except *P. pogonias*), abdomen, dorsal. 223–225, *P. columnaris*; 226–228, *P. squarrosus*; 229–231, *P. turriger*; 232–234, *P. turritus*; 235–237, *P. raphanus*; 238–239, *P. pogonias* (juvenile). Scale lines: Figs 238 & 239 = 1.0 mm; scale below Fig. 228 applies to all other carapaces and abdomens, 1.0 mm for carapaces, 2.0 mm for abdomens; epigynes with individual lines, all = 0.5 mm.

method) then output in NEXUS format for analysis using PAUP* 4.0b10 (Swofford, 2001). Voucher specimens and GenBank accession numbers are listed in Appendix 2.

COI alignment was straightforward as this is a coding sequence and there were no unmatched sections between samples. ITS2 was more problematic because this is a non-coding gene and hence has rather variable areas that require the addition of gaps for alignment. A simplification of the alignment method outlined by Mindell (1991) was used. The alignment was initiated with the two most similar



Figs 240–247. Other SE Asian species. 240–242, *Poltys elevatus* type specimen: 240, carapace lateral; 241, abdomen, dorsal; 242, epigyne posterior. 243: *P. elevatus* ex Singapore (BMNH), left leg IV and part of abdomen, showing brush of hairs on posteroventral femur. 244–246, example of *P. mouhoti*-group ex Malaysia (JK coll.): 244, carapace lateral; 245, abdomen, dorsal; 246, epigyne posterior. 247, *P. pannuceus*, type specimen, epigyne posterior. Scale lines: epigynes and fig. 243 inset = 0.5 mm, others, and main part of Fig. 243 = 2.0 mm.

sequences and each remaining sequence was added and aligned in turn according to its similarity to the first. Sequence alignment in ClustalX used gap penalties of 15 to open a gap and 6.6 for lengthening. A few further adjustments to the alignment were made manually. The manual adjustments were each tested and those that produced the shortest tree in a simple parsimony analysis were accepted.

The majority of sequencing effort was directed at the COI gene. Each putative *Poltys* taxon was represented by at least two samples from geographically separated sites (if possible). Species that exhibited interspecific variation in characters other than abdominal shape were represented by a wider range of samples. The ITS2 sequences could not be amplified for two species and so complete taxon representation was not achieved. Original sequence data are available from GenBank (Appendix 2). For each gene, PAUP* was used to compare the sequences from each individual sampled to all others to obtain uncorrected pairwise overall similarity percentages (100× number of substitutions/total number of bases).

Results. For COI (Fig. 248) within-species variation is 0–5.19% (mean=1.81), if the two populations of *P. illepidus* are considered as conspecific. If the nine *P. illepidus* North to South pairwise comparisons are removed (but the within population figures retained) the range is 0–2.36% (mean=0.93). Between species, the range is 7.55–20.75% (mean=14.49) if *P. illepidus* is considered as a single species, or 4.25–20.75% (mean=14.26) if the two populations are considered separately. These figures are the basis for the histogram, Fig. 248. They are slightly different to those summarized in Table 1 (below diagonal), which are averaged within a species or population. Either of the above interspecific values is comparable with those reported for chelicerates by Hebert *et al.* (2003). The intraspecific values are also comparable to those reported by other studies, but suggest that based on this COI data set, two cryptic species might be present within the Australian distribution of *P. illepidus*. Other than this, the species as defined in the taxonomy section are supported by this analysis.

For ITS2 (Table 1, above diagonal) no variation was found between specimens of the same species (including between northern and southern *P. illepidus*). No complete sequences were obtained for *P. milledgei* or *P. noblei*. *Poltys illepidus* and *P. stygius* were extremely close, differing by only 0.75%, but other species varied between 5.84% (*P. laciniosus* v. *P. grayi*) and 12.18% (*P. jujorum* v. *P. grayi*). The mean interspecific difference is 9.57%

Table 1. Mean uncorrected pairwise differences ×100% for COI and ITS2 (averaged between specimens within populations or species).

ITS2 above / COI below	*P. frenchi*	*P. grayi*	*P. illepidus* (northern)	*P. illepidus* (southern)	*P. jujorum*	*P. laciniosus*	*P. milledgei*	*P. noblei*	*P. stygius*
P. frenchi	—	10.91	10.69	10.69	12.05	6.92	no data	no data	10.94
P. grayi	11.79	—	11.08	11.08	12.18	5.84	no data	no data	11.84
P. illepidus (N)	13.36	12.66	—	0	8.84	10.46	no data	no data	0.75
P. illepidus (S)	15.25	13.60	4.56	—	8.84	10.46	no data	no data	0.75
P. jujorum	18.71	16.90	13.52	12.42	—	10.80	no data	no data	9.09
P. laciniosus	12.55	10.05	10.63	10.91	13.43	—	no data	no data	11.22
P. milledgei	19.50	16.43	15.41	16.51	14.47	16.67	—	no data	no data
P. noblei	14.15	7.78	12.89	14.31	16.98	10.75	15.57	—	no data
P. stygius	16.51	15.80	14.47	14.31	15.57	13.49	15.88	15.09	—

Discussion

Problems of *Poltys* species separation and the application of data derived from DNA. The separation of species by morphology presented in the taxonomic section is consistent with DNA evidence overall. The COI data alone, however, are equivocal for the northern and southern populations of *P. illepidus* and give different levels of separation for some taxon pairs to that suggested by other data (e.g., *P. illepidus* c.f. *P. stygius*, Table 1). Such non-concordance of data from different genes has been reported in a number of studies such as that by Navajas & Boursot (2003) who also used COI and ITS2. Yet another example emphasizes the need for the cautionary approach, which requires evidence from several sources, as espoused by several authors (e.g., Moritz *et al.*, 1992; Sperling & Harrison, 1994).

As discussed at the start of this section, there are certain problems in the separation of some *Poltys* species using morphological characters alone. These problems can now be more effectively addressed by also considering molecular evidence, as follows:

1 Cryptic taxa. The possible presence of cryptic taxa in *P. laciniosus* was certainly resolved by COI, and *P. noblei* has now been separated. In retrospect, these were not truly cryptic species, but the variation present in abdominal shape is far more obvious, and in opposition to, the more subtle signals found in the epigyne morphology. Once the results from the initial DNA sequencing validated the levels of variation present within one species (Smith, 2003), and males of *P. laciniosus* were finally collected, the problem dissolved. The results also indicate a possible cryptic taxon in the southern populations of *P. illepidus*; this is discussed further under 3, below.

2 Morphological variation between populations. Whether the allopatric populations of *P. noblei* v. *P. grayi* and *P. laciniosus* from the Kimberley v. elsewhere, are separate species is not completely resolved, due to a lack of ITS2 data for critical specimens. Overall, the data support separation of *P. grayi* and *P. noblei*, although with 7–8% difference in COI sequences, they are the most closely related species amongst the taxa examined. The morphological differences are subtle, but quite definite considering the lack of genitalic differentiation shown between some other species pairs. A partial ITS2 sequence obtained for *P. noblei* also appeared to have a few base changes compared to *P. grayi*, but this could not be corroborated due to the high noise level in the data. The case of conspecificity of *P. laciniosus* from the NT and Kimberley regions with those from the rest of Australia is less strongly defined. COI indicates that there is no specific differentiation, yet the morphology of the epigynes of the two recorded females is quite distinctive. No males are yet known from this area. The DNA extraction from the 75% ethanol preserved NT specimen was not assayed for the ITS2 gene as attempts from other specimens of a similar age had not been successful. Further work needs to be carried out in this area.

3 Clinal variation. The problem of interpreting clinal variation in the genitalia of *P. laciniosus* and the modified leg macrosetae of *P. illepidus* is also only partially resolved. Specimens of *P. laciniosus* from across Australia showed a variation of approximately 1–2% in the COI gene (many more specimens than shown in Appendix 2 were actually sequenced; the five shown here were chosen as exemplars as they covered the range of variation in COI, in epigynal features and also represented most regions of Australia). There was no obvious pattern to the COI variation, either geographically, or with respect to epigyne morphology. With the possible exception of the NT specimen, discussed above, it is highly probable that *P. laciniosus* has an Australia-wide distribution. Conversely, some uncertainties remain with respect to *P. illepidus*. Overall, given the lack both of morphological variation, and of differentiation in the sequences of ITS2 examined, these are most likely to be a single species despite the consistent 4–5% variation in COI. When suitably preserved specimens are available from the geographic area between the two extremes sampled so far for DNA, it would be desirable to carry out further work. Cloning of ITS2 samples to examine intra-individual variation might also provide useful information as there were certain base positions that consistently showed a strong secondary signal under the consensus sequence that has been used here.

4 Polymorphic species. This has indirectly been dealt with under 1, above, as it was the basis for the possible presence of one or more cryptic species. It is now apparent that this situation is not really applicable to

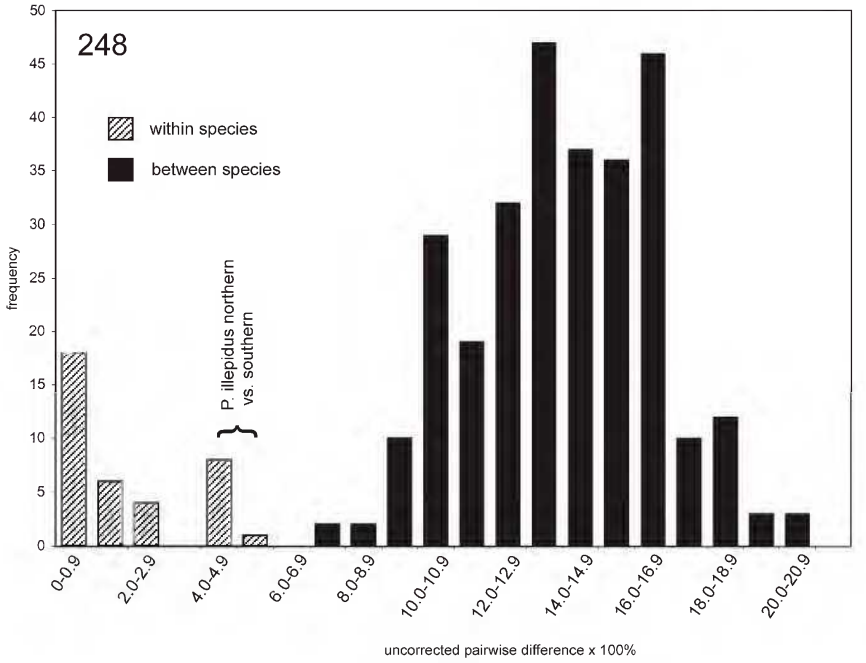


Fig. 248. Frequency histogram of within and between species distances (% difference) calculated from uncorrected pairwise distances.

Poltys, as the abdominal variation can be seen to be continuous, rather than discretely polymorphic, once enough specimens have been examined. Historically, however, it has certainly caused confusion, and resulted in the species recognized here as *P. laciniosus* being described four times, whilst *P. noblei* was overlooked. Evidence for the variable morphology within several *Poltys* species was supported by the COI data, and was backed up by other morphological data and rearing experiments (Smith, 2003 and further unpublished data.).

Comments on some characters and aspects of *Poltys* biology. There are a number of characters that might also prove to be of interest, either within the context of *Poltys* species-groups or more widely in araneids as a whole. For instance, the arrangement of leg macrosetae has stood out as being quite distinct in some genera, and the sturdy, untoothed accessory hairs shown in Fig. 23 may also be of interest. The spinnerets, both in morphological and genetic aspects may also offer opportunities. At present only single representatives from the three main *Poltys*-groups within Australia have been investigated with respect to spinneret spigots, but the variation in piriform spigot numbers on the ALS is striking (Figs 17–19). The silk from these forms the basal attachment disc for the dragline. The larger size of *P. illepidus* and associated larger webs made in bigger gaps would necessitate stronger lines and attachment points; but there is also a difference in behaviour between these and the smaller species of the *P. laciniosus*-group. Whilst a spider is concealed during the day it is attached to a silk disc on the tree or twig. *Poltys illepidus* are usually reluctant to move if touched and carry on the pretence of being an inanimate lump of twig as far as possible. The *P. laciniosus*-group animals, however, usually shuffle around the twig in response to an initial probing finger and often launch themselves off the twig with continued disturbance. The much greater number of spigots of *P. illepidus* may reflect this habit of remaining firmly attached. It would be interesting to quantify this behaviour experimentally and investigate other *Poltys* species more fully, as well as other araneids with similar behavioural traits.

Silk producing gland proteins have also received increasing attention in recent times (e.g., Gatesy *et al.*, 2001; Hayashi *et al.*, 2004). Whilst requiring extraction from live material and hence being impractical for poorly known or rare taxa, the properties of *Poltys* silk have potential to be most interesting. It has not been possible to analyse the mechanical properties of *Poltys* silk as part of this project, but some informal observations suggest that it is far softer than many araneid silks yet is brittle when suddenly stressed. Webs, at least of the *P. laciniosus*-group species, are of fine stretchy silk. This helps entangle "flappy" prey such as Lepidoptera, Neuroptera and Isoptera, whilst fast flying hard insects such as Coleoptera often pass straight through, leaving a neat hole without pulling the rest of the web down. An accidental sharp knock against the branch supporting the web has sometimes resulted in the whole web disintegrating as if exploding, leaving nothing but a few frame lines. This disconcerting disappearing trick may be dependent on moisture content, but I have not noticed it happening to the webs of other taxa. These properties may point towards an unusual composition of silk proteins, which could give useful comparative data as silk libraries are built up.

Finally, and leading on from the discussion of variable morphology above, the occurrence of this variability in Australian species may be of evolutionary significance. Little is currently known about intraspecific variation outside of the Australian species, but specimens that have been examined in the broader context of this study suggest that variation is far more limited in the *P. columnaris* species group, in *P. elevatus* and in the *P. mouhoti*-group. In each of these putative taxa, variations have been observed in the length of the abdomen and in striking colour patterns, but no specimens have been seen with the humeral projections that create the potential for so much variety in the *P. illepidus*-group, in *P. frenchi* and the *P. laciniosus*-group species. Whilst the scrubby rainforest habitat preferences of *P. frenchi* overlap with the members of other species groups, and *P. noblei* also favours moister coastal habitats, *P. laciniosus* seems to have successfully moved in to much more hostile, more open country. *Poltys laciniosus*, and also the other species, are patchy on a local scale, but can be abundant. The key to this success, as well as an explanation for their patchiness, may lie in the variability of individual specimens. From a research point of view, this variability holds great potential for future work in the Australian *Poltys*, not to mention the many other unexplored aspects of the biology and behaviour of the taxon and the taxonomy of the rest of the genus.

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Appendix 1. Summary checklist of described Southeast Asian and Australasian *Poltys* species. The following abbreviations have been used: *f.*, figure(s); *pl.*, plate(s); *syn.*, synonym; *s/syn.*, senior synonym.

species	type locality or country	type repository	sex of primary type	status (Platnick, 2005)	status assigned in current work	known distribution and notes
Australia						
P. bimaculatus Keyserling, 1886:131, pl.10, f.4	Peak Downs, Qld	ZMH	juvenile	current	syn. = *P. laciniosus*	
P. coronatus Keyserling, 1886:128, f.10	Cape York, Qld	not located	female	current	syn. = *P. illepidus*	described from a specimen in Bradley's collection.
P. frenchi Hogg, 1899:143, pl.13, f.2	Endeavour River, Qld	NMV	female	current	no change	northern Australia, New Guinea and southern Moluccas
P. grayi n.sp.	Lord Howe Island	AM	female	—	new species	Lord Howe Island
P. jujorum n.sp.	Goldsborough, Qld	QM	female	—	new species	northeastern Australia
P. keyserlingi Keyserling, 1886:129, pl.10, f.3	Gayndah, Qld	ZMH	juvenile	current	syn. = *P. illepidus*	
P. laciniosus Keyserling, 1886:123, pl.9, f.7	Peak Downs, Qld	BMNH	female	current	no change	Australian mainland
P. mammeatus Keyserling, 1886:125, pl.10, f.1	Peak Downs, Qld	ZMH	female	current	syn. = *P. laciniosus*	
P. microtuberculatus Rainbow, 1916:118, pl.22, f.44	Gordonvale, Qld	AM	juvenile	current	syn. = *P. stygius*	
P. milledgei n.sp.	Darwin, NT	AM	female	—	new species	northern Australia and southern Indonesia
P. multituberculatus Rainbow, 1898:82, pl.18, f.2	Cooktown, Qld	AM	female	current	syn. = *P. illepidus*	
P. noblei n.sp.	Sydney, NSW	AM	female	—	new species	eastern coast of Australia
P. penicillatus Rainbow, 1920:249, pl.29, f.57	Lord Howe Island	SAMA	female	current	syn. = *P. illepidus*	
P. salebrosus Rainbow, 1904:104, f.28–29	Fremantle, WA	AM	juvenile	current	syn. = *P. laciniosus*	
New Caledonia						
P. timmeh n.sp.	New Caledonia	HNHM	female	—	new species	New Caledonia and the Loyalty Islands
New Guinea						
P. dromedarius (Bradley, 1876b:249, f.2)	Hall Sound, PNG	not located	probably juvenile	current	*nomen dubium*	should be in MMUS
P. papuensis (Bradley, 1876a:223, f.2)	Hall Sound, PNG	not located	probably adult	current	*nomen dubium*	should be in MMUS; may be s/syn. of *P. frenchi*
P. sigillatus Chrysanthus, 1961:211, f.74–77	West Papua (Indonesia)	RMNH	female	current	syn. = *P. frenchi*	

species	type locality or country	type repository	sex of primary type	status (Platnick, 2005)	status assigned in current work	known distribution and notes
Malaysia and Indonesia						
P. apiculatus Thorell, 1892:228	Singapore	not located	unknown	current	no change (not studied)	
P. columnaris Thorell, 1890:87	Sumatra	OUM	female	current	no change (not studied)	Sumatra, Burma probably Vietnam, possibly N Borneo
P. elevatus Thorell, 1890:82	Sumatra	OUM	female	current	no change (not studied)	Sumatra, Singapore. Very distinctive brush of hairs on retrolateral femur IV—may be stridulatory
P. idae (Ausserer, 1871:817, pl.5, f.1–3)	Borneo	NHMW	?female (not checked)	current	no change (not studied)	*P. mouhoti*-group
P. illepidus C.L. Koch, 1843:97, f.821	P.Bintan, Indonesia	not located	unknown	current	no change	northern Australia to at least Thailand. Solomon Is. and oceanic islands to the east of Australia
P. longitergus Hogg, 1919:95, pl.10, f.7	Sumatra	BMNH	juvenile	current	no change (not studied)	*P. mouhoti*-group
P. moluccum (Doleschall, 1859:45, f.1)	Amboina [Ambon]	not located	unknown	syn.= *P. illepidus*	*nomen dubium* (not *P. illepidus*)	may be s/syn. of *P. frenchi*
Nicobar Islands						
P. pogonias Thorell, 1891:54	Nicobar Is	ZMUC	juvenile	current	no change (not studied)	*P. columnaris*-group
Burma, Laos and Vietnam						
P. acuminatus Thorell, 1898:346	Burma	MSNG	juvenile	current	no change (not studied)	*P. illepidus*-group, probably not identifiable
P. dubius (Walckenaer, 1842:198)	Vietnam	not located	probably juvenile	current	no change (not studied)	probably not identifiable
P. mouhoti (Günther, 1862:2, pl.8, f.A)	Laos	BMNH	female	current	no change (not studied)	similar or conspecific species recorded from Borneo to India
P. pannuceus Thorell, 1895:167	Burma	BMNH	female	current	no change (not studied)	Burma to Sumatra, ?*P. illepidus*-group
P. raphanus Thorell, 1898:348	Burma	MSNG	female	current	no change (not studied)	probably = *P. turritus*
P. squarrosus Thorell, 1898:350	Burma	MSNG	female	current	no change (not studied)	*P. columnaris*-group
P. stygius Thorell, 1898:344	Burma	MSNG	female	current	no change	northern Australia to Burma
P. turritus Thorell, 1898:347	Burma	MSNG	female	current	no change (not studied)	*P. columnaris*-group
P. turriger Simon, 1897:480	Vietnam	MNHNP	female	current	no change (not studied)	*P. columnaris*-group
P. unguifer Simon, 1909:117	Vietnam	MNHNP	juvenile	current	no change (not studied)	*P. illepidus*-group, may not be identifiable

Appendix 2. Specimens used for DNA sequencing. Most adult *Poltys* are also included in Material Examined in Taxonomic section. Juvenile specimens have field numbers (prefixed FN) but are not fully registered. All vouchers are in AM unless stated. GenBank accession numbers are appended. Where two specimens share exactly the same sequence only one is submitted to GenBank.

Mitochondrial DNA data (COI)

Poltys illepidus (northern)
- ♀ KS90970, Hopevale Rd, Qld. GenBank AY997634
- ♀ KS75537, Trinity Park, Qld. GenBank AY997635
- ♀ KS55732, Litchfield NP, NT. Seq. as KS75537

Poltys illepidus (southern)
- ♀ KS90971, Rockhampton Qld. GenBank AY997636
- ♀ S20786 (QM), Brisbane, Qld. GenBank AY997637
- juv FN14984, Rockhampton, Qld. Seq. as S20786

Poltys stygius
- ♀ KS86261, Edmonton, Qld. GenBank AY997638
- ♀ KS90969, Trinity Park, Qld. Seq. as KS86261

Poltys jujorum
- ♀♀ KS58065, Trinity Park, Qld. GenBank AY997639–40
- ♀ KS58066, Abergowrie SF, Qld. GenBank AY997641

Poltys milledgei
- ♀ KS55726, Humpty Doo, NT. GenBank AY997642
- ♀ KS53839, Litchfield NP, NT. GenBank AY997643
- ♀ KS55747, Lake Argyle, WA. GenBank AY997644

Poltys frenchi
- ♀ KS86345, Cape Kimberley, Qld. GenBank AY997645
- juv FN14677, Trinity Park, Qld. Seq. as KS86345
- juv FN14782, Cape Tribulation, Qld. Seq. as KS86345

Poltys laciniosus
- ♀ KS75494, Pilliga SF, NSW. GenBank AY997646
- ♀ KS55745, Gregory NP, NT. GenBank AY997647
- ♀ KS70365, Clermont, Qld. GenBank AY997648
- ♀ KS78310, Coffin Bay, SA. GenBank AY997649
- ♀ WAM 98/1970, Torndirrup, WA. GenBank AY997650

Poltys grayi
- ♀ KS90968, Lagoon Rd, LHI. GenBank AY997652
- ♀ KS90967, start Gower track, LHI. GenBank AY997653

Poltys noblei
- ♀♀ KS90958-66, Sydney specimens from Smith (2003, all identical sequences). GenBank AY997651 (nominally for KS90958). Also see partial sequences presented in Smith (2003, ex Ninety Mile Beach, Victoria, and Forty Mile Scrub, Queensland) for variation

Ribosomal DNA data (ITS2)

Poltys illepidus (northern)
- ♀KS90970, Hopevale Rd, Qld. GenBank AY997626
- ♀KS55732, Litchfield NP, NT. Seq. as KS90970

Poltys illepidus (southern)
- ♀KS90971, Rockhampton Qld. Seq. as KS90970

Poltys stygius
- ♀KS86261, Edmonton, Qld. GenBank AY997627
- ♀KS90969, Trinity Park, Qld. Seq. as KS86261

Poltys jujorum
- ♀KS86347, Trinity Park, Qld. GenBank AY997628

Poltys frenchi
- ♀KS86345, Cape Kimberley, Qld. GenBank AY997629

Poltys laciniosus
- ♀KS74960, Warrumbungles NP, NSW. GenBank AY997630
- ♀KS78315, Quorn, SA. Seq. as KS74960

Poltys grayi
- ♀KS90968, Lagoon Rd, LHI. GenBank AY997631